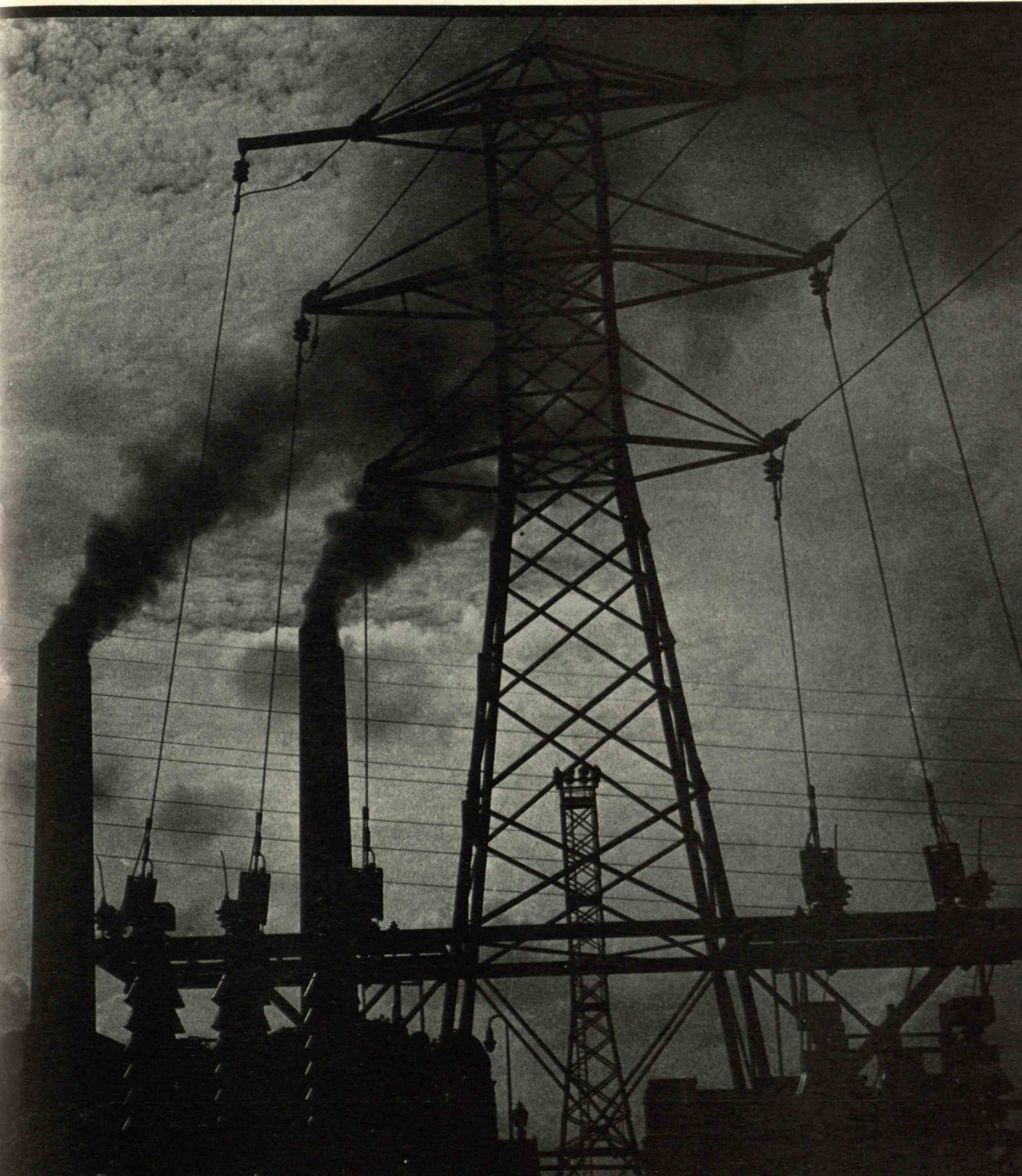


December 1935

TECHNOLOGY REVIEW

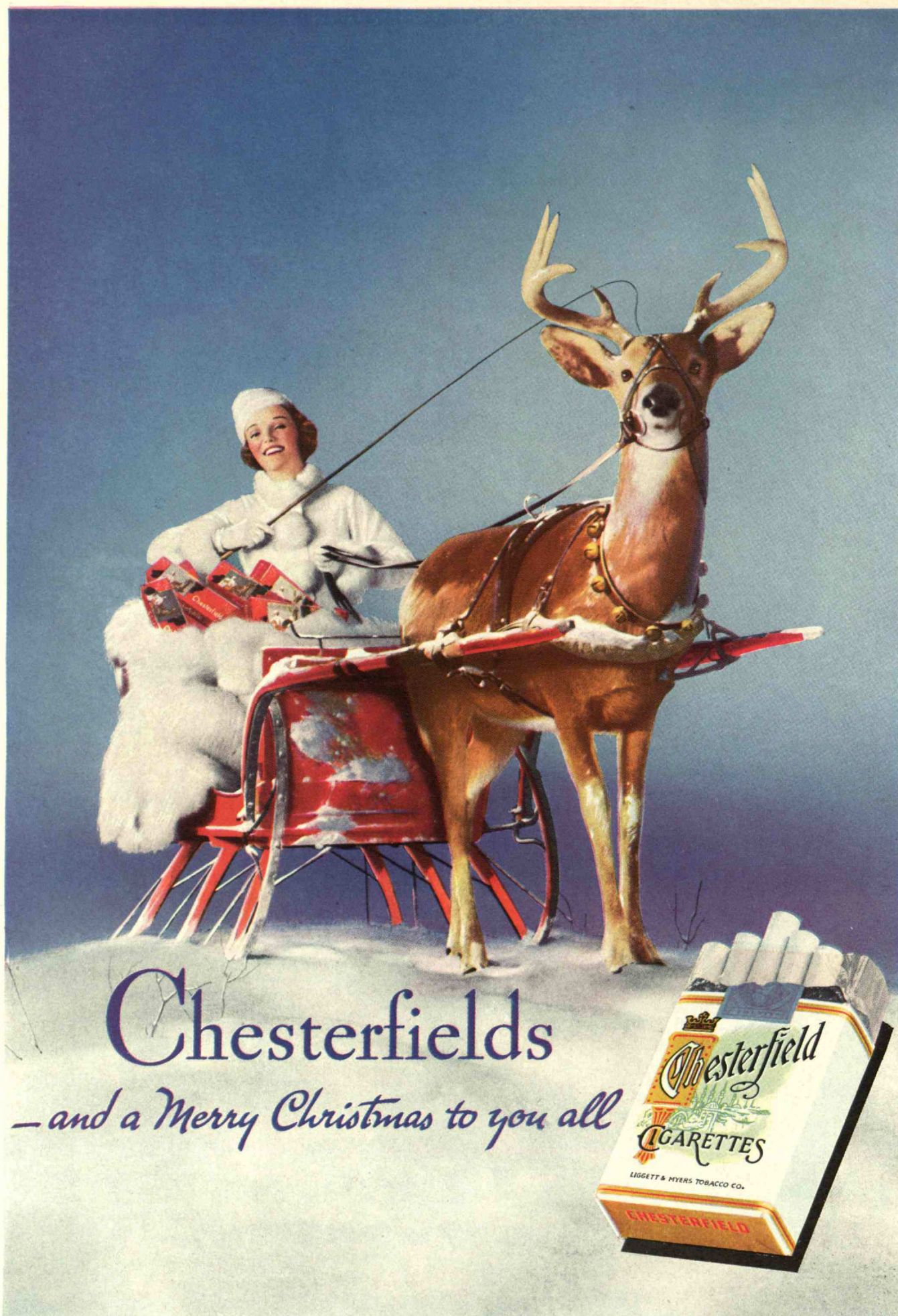
Title Reg. in U. S. Pat. Office



technology review

Published by MIT

This PDF is for your personal, non-commercial use only.
Distribution and use of this material are governed by copyright law.
For non-personal use, or to order multiple copies please email
permissions@technologyreview.com.



Chesterfields

— and a Merry Christmas to you all

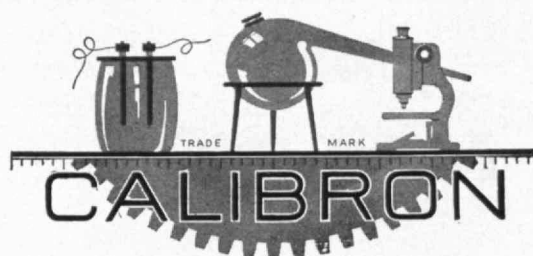
© 1935, LIGGETT & MYERS TOBACCO CO.

THE TABULAR VIEW

AS indicated in his article, CHARLES CAMSELL, '09, has more than a professional interest in the Canadian Northwest. He was born at Fort Liard and, early in his career, explored and prospected the Mackenzie River basin, experiencing all the privations and disappointments that fall to the lot of prospectors in the far North. He joined, in 1900, a geological party to Great Bear Lake as a handy man, and it was on this expedition that were first seen and reported the rocks stained with cobalt blue and copper green which later were to point the way to the discovery of the great radium ore deposits at Great Bear Lake. His able work on this expedition assured his success and he progressed rapidly, until, today, he is Deputy Minister of Mines of Canada. In recognition of his contributions to the development of the Dominion, His Majesty King George V recently made Dr. Camsell a Companion of the Order of St. Michael and St. George.

BORN in London and educated in Switzerland, France, and England, DR. LYDIARD H. W. HORTON received his A.B. from Williams College in 1901 and graduate degrees from Columbia University. Besides medical study at Harvard and the University of Pennsylvania, he worked with the late William James. From 1912 to 1920 he collaborated with Dr. Morton Prince on the *Journal of Abnormal Psychology*. At the present time, he is a consulting psychologist in Boston.

AS a research associate in electrical engineering at the Institute, J. WARREN HORTON, '14, is now working coöperatively with a Boston hospital on certain electrical problems related to medical diagnosis. For over 20 years he has been engaged in electrical engineering; 12 of these years were spent with the Bell Telephone Laboratories working on carrier telegraphy and telephony problems, frequency measurements, and television development, and, before coming to the Institute, he was chief engineer at the General Radio Company. ¶ Since the earliest known bookplate was presented to the Carthusian monastery at Buxheim, Germany, in 1480, there has probably been no greater enthusiast for the art of bookplate designing than ELISHA BROWN BIRD, '91, some of whose bookplates appear on page 104 of this issue. Mr. Bird commenced his serious work on bookplates soon after his graduation from the Institute, where he was on the editorial board of *Technique*. His first job was as cartoonist with the *Boston Herald*, and he was the first artist in America to sketch baseball games while they were in progress. Some 16 years ago he went to New York, where, in addition to his bookplate work, he is promotion designer for the *New York Times*. In 1934 a book containing a complete description of some 400 bookplates designed during his career for the libraries of book lovers the world over, together with reproductions of the most distinctive, was published in Washington. For over a decade Mr. Bird has been President of the American Society of Bookplate Collectors and Designers.



The first issue of the

CALIBRON NOTEBOOK

contains a description of our unusual Guaranteed Research service; the second is a report on one of our engineering developments. We shall be glad to send you copies on request.

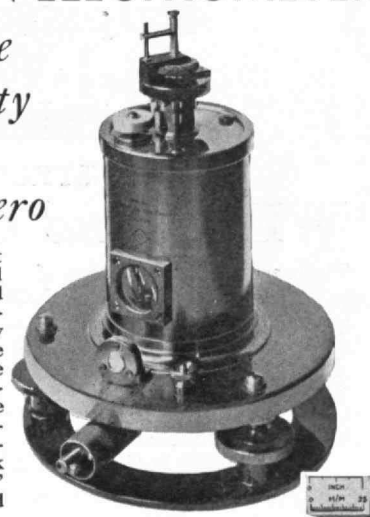
CALIBRON PRODUCTS, INC.

West Orange, New Jersey

COMPTON ELECTROMETER

*Extreme
Sensitivity
and
Stable Zero*

This instrument embodies the sound detail design and precision of construction necessary to fully realize the advantages of the Compton Modifications. The needle and quadrant adjustments are entirely free from backlash or "wobble," and are provided with accurate micrometer heads. It has a stable zero. Once set up it can be brought to any required state of sensitivity. Described in list T 169.

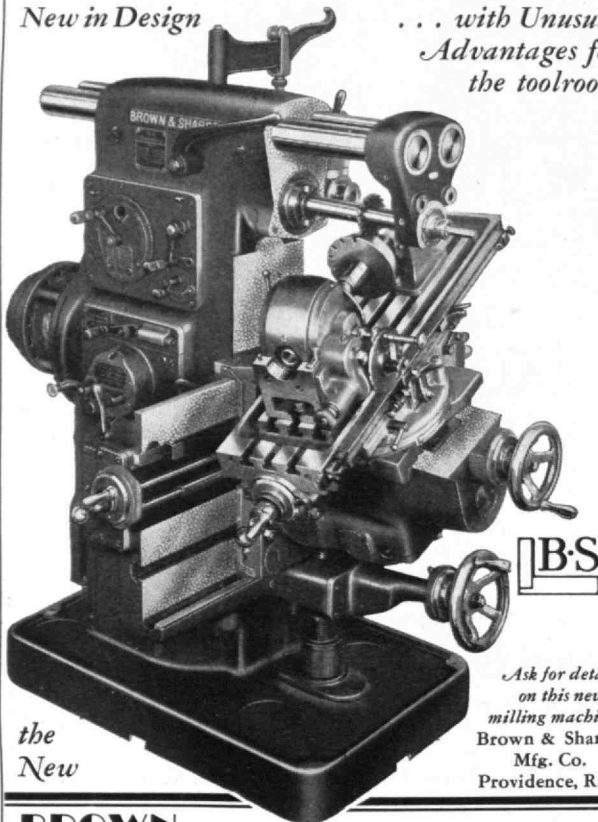


OTHER CAMBRIDGE PRODUCTS:

Moisture Indicators and Recorders Physical Testing Instruments
Surface Pyrometers Laboratory Insts. for A.C. & D.C.
Galvanometers Engineering Instruments
Gas Analysis Equipment Physiological Instruments
and other Mechanical and Electrical Instruments.

**CAMBRIDGE
INSTRUMENT CO INC**

Pioneer Manufacturers of Precision Instruments
3732 Grand Central Term., New York

UNIQUE in PERFORMANCE*New in Design**... with Unusual
Advantages for
the toolroom***B.S.**

*Ask for details
on this new
milling machine.
Brown & Sharpe
Mfg. Co.
Providence, R. I.*

*the
New***BROWN
&
SHARPE****OMNIVERSAL**

22,400 CONSTRUCTIONS
WIRES and CABLES

There are 10 different types of
ELECTRICAL CONDUCTORS

There are 8 different types of
INSULATION FOR WIRES AND CABLES

There are 15 different types of
COVERINGS FOR WIRES AND CABLES

There are 7 different types of
FINISHES FOR WIRES AND CABLES

Each of the above types have different
SIZES OR COLORS

Have you the best construction for your service?

Have you been unable to obtain a suitable
wire or cable?

Could you use a less expensive construction to obtain
the same result?

*Write for our folder on constructions and explain your
particular requirement. We may be of service*

**BOSTON INSULATED
WIRE AND CABLE COMPANY**
BOSTON, MASSACHUSETTS

**ANHYDREX
RUBBER INSULATION
FOR WIRES AND CABLES**

With ANHYDREX insulation, lead sheaths and other metallic coverings may safely be omitted from submarine or underground power cables thereby doing away with the possibility of electrolysis, chemical corrosion, crystallization and sheath currents. ANHYDREX does not absorb moisture. It has the electrical properties of high grade rubber and is impervious to moisture.

*Ask for descriptive booklet entitled "ANHYDREX
Rubber Insulation for Wires and Cables."*

SIMPLEX WIRE & CABLE CO.

79 Sidney Street, Cambridge A
BOSTON, MASS.

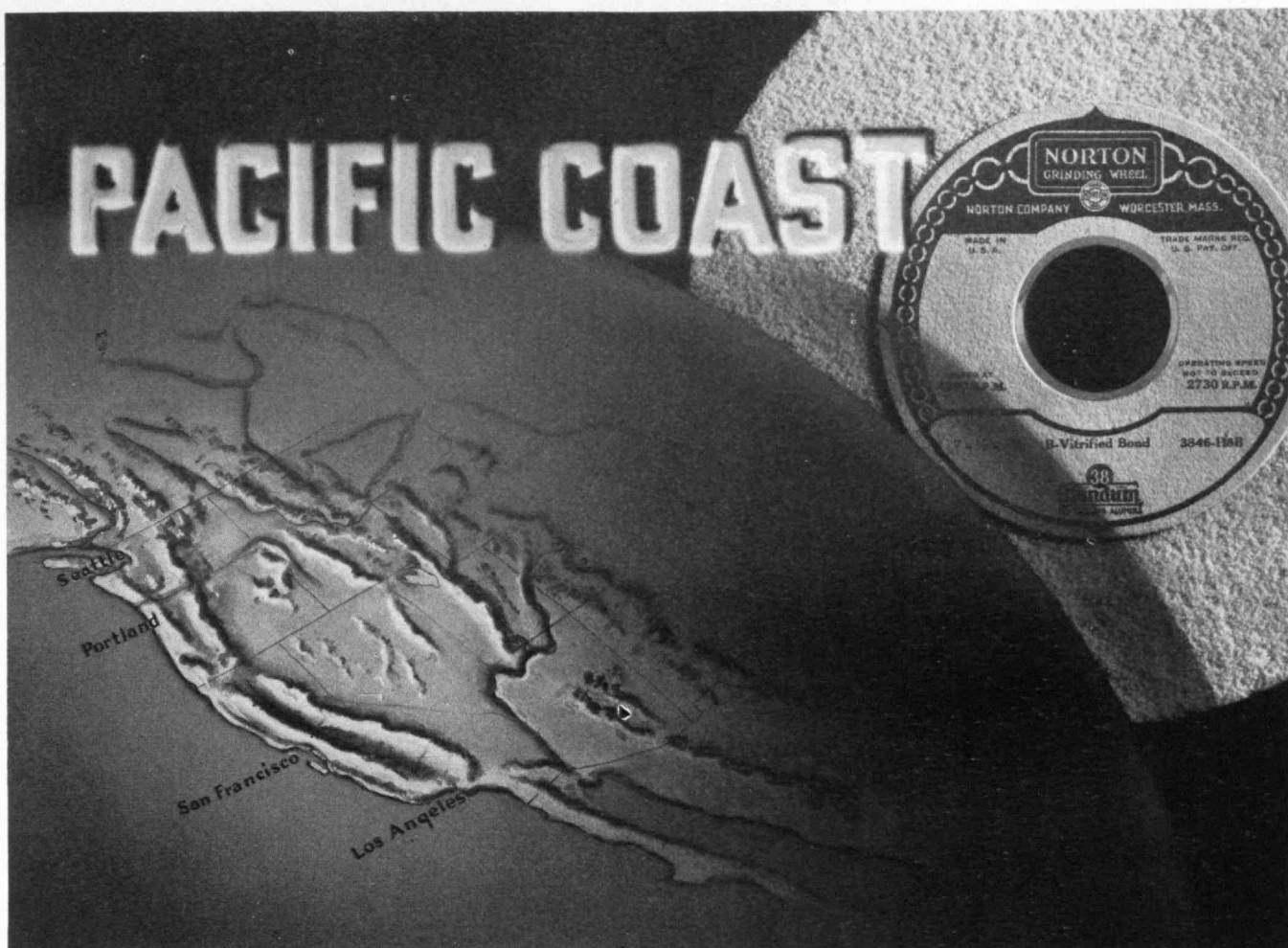
Have You
**PRINTING?
PROBLEMS?**

WE HAVE a department in our plant equipped for experimental work in photography and plate and cylinder etching, with special machinery for printing on leather, rubber, and fabrics, in both sheet and roll form, with special inks and lacquers. We have recently developed *Ascolac Leather Shoe Trim, Dri-Rol Transfer Paper, Illustro Gummed Tape, Decorative Box Papers.*

[SPECIALIZING IN NARROW
WIDTH ROLL PRINTING]

**The Murray Printing
Company**

KENDALL SQUARE, CAMBRIDGE



COAST to COAST—New England to the Northwest, Southwest—the Grinding Wheel has cut its trail. Follow Norton Abrasives to the virgin forests of the Northwest, to the great shipyards of the Pacific, to every lumber camp and every machine shop up and down the coast.

In the making of the great tractors and log handling machinery of the forests the Grinding Wheel has done its part. Giant ten-ton Pulpstones (Norton Abrasives) are converting logs into wood pulp, your daily newspaper. Grinding Wheels and Sharpening Stones are servicing the giant saws and the keen axes that work up the huge timber. It would be an interesting story could we relate here in detail how Norton Abrasives serve the metal industry and the glass industry as well as lumber, how Norton Refractories aid in handling heat in the great heat treating plants, how Non-slip Floors and Stair Treads provide safety in the modern buildings of modern cities.

NORTON COMPANY, WORCESTER, MASS.

*Behr-Manning Corporation and Norton Pike Co., Troy, N. Y.
are Divisions of Norton Company*

*Fiftieth
Norton Year
1885-1935*



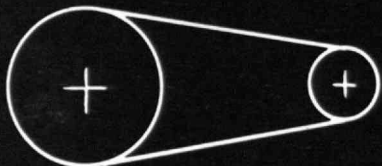
**FIFTIETH
NORTON
YEAR
1885-1935**

TRULY ENDLESS

— *practically stretchless*
— THE PERFECT BELT FOR HIGH-SPEED INDUSTRIAL DRIVES

This photograph shows you why the Goodyear COMPASS (Cord) Endless* Belt stands alone on modern high-speed drives where STRETCH and SLIP cannot be tolerated. It has no splice! The load is carried by a layer of heavy endless cords, spiralled continuously — a patented Goodyear construction that is PRACTICALLY STRETCHLESS! The cords are encased in a sturdy fabric envelope, double on pulley side, that takes the surface wear. No more flexible belt is made — even on high-speed, small pulley drives COMPASS often lasts up to 10 times longer than other belts. And every COMPASS is individually specified to your drive, in the correct size and weight, by the G.T.M. — Goodyear Technical Man — to insure perfect performance. Let this practical belting expert advise you — write Goodyear, Akron, Ohio, or Los Angeles, California — or the nearest Goodyear Mechanical Rubber Goods Distributor.

*Goodyear Compass Belts can also be vulcanized endless right on the job.

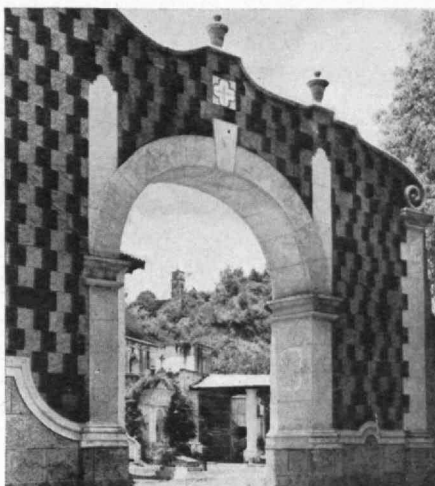


**BELTS
MOLDED GOODS
HOSE
PACKING**

MADE BY THE MAKERS OF
GOODYEAR TIRES



THE GREATEST NAME IN RUBBER
GOODYEAR



Gate to the yard of
the church on Sacre
Monte, Amecameca,
Mexico

Frederick B. Wolf, '28

THE TECHNOLOGY REVIEW

Title Reg. U. S. Pat. Office

EDITED AT THE MASSACHUSETTS INSTITUTE OF TECHNOLOGY

VOL. 38, NO. 3

CONTENTS

DECEMBER, 1935

THE COVER

From a photograph by Alexander Piaget

SPHERICAL GAS TANK	FRONTISPIECE	86
FLYING OVER NORTHWESTERN CANADA	By CHARLES CAMSELL	94
<i>Does a Tropical Valley Exist Near Devil's Gorge?</i> <i>What Happens to the Rockies North of Latitude 60°?</i>		
EVERYTHING IMPROVED BUT THE MIND	By LYDIARD H. W. HORTON	97
<i>The Need for Engineering Analysis in Mental Science</i>		
ADVENTURES IN A VACUUM	By J. WARREN HORTON	101
<i>Electrons at Work and Play</i>		
BOOKPLATES BY ELISHA BROWN BIRD, '91		104

THE TABULAR VIEW		81
<i>Notes on Contributors and Contributions</i>		
THE TREND OF AFFAIRS		87
<i>News of Science and Engineering</i>		
THE INSTITUTE GAZETTE		105
<i>Relating to the Massachusetts Institute of Technology</i>		
BENDING MOMENTS		111

Editor
J. RHYNE KILLIAN, JR.

TENNEY L. DAVIS

Publisher
HAROLD E. LOBDELL

Editorial Associates
JOHN J. ROWLANDS

Business Manager
RALPH T. JOPE

JOHN ELY BURCHARD

PUBLISHED MONTHLY FROM OCTOBER TO MAY INCLUSIVE AND IN JULY ON THE TWENTY-SEVENTH OF THE MONTH PRECEDING THE DATE OF ISSUE AT 50 CENTS A COPY. ANNUAL SUBSCRIPTION \$3.50; CANADIAN AND FOREIGN SUBSCRIPTION \$4.00. PUBLISHED FOR THE ALUMNI ASSOCIATION OF THE M. I. T. EDWARD L. MORELAND, PRESIDENT; MARSHALL B. DALTON, C. A. SAWYER, JR., VICE-PRESIDENTS; CHARLES E. LOCKE, SECRETARY; J. RHYNE KILLIAN, JR., TREASURER.

PUBLISHED AT THE RUMFORD PRESS, 10 FERRY STREET, CONCORD, N. H. EDITORIAL OFFICE, ROOM 11-203, MASSACHUSETTS INSTITUTE OF TECHNOLOGY, CAMBRIDGE A. MASS. ENTERED AS SECOND-CLASS MAIL MATTER AT THE POST OFFICE AT CONCORD, N. H. COPYRIGHT, 1935, BY THE ALUMNI ASSOCIATION OF THE MASSACHUSETTS INSTITUTE OF TECHNOLOGY. THREE WEEKS MUST BE ALLOWED TO EFFECT CHANGES OF ADDRESS. BOTH OLD AND NEW ADDRESSES SHOULD BE GIVEN.



*Spherical Gas
Reservoir, Uni-
versity City,
Mo., from a
photograph by
Alexander
Piaget*

THE TECHNOLOGY REVIEW

Vol. 38, No. 3



December, 1935

The Trend of Affairs

Waterproof Mortar

A DUCK'S back is proverbial for its ability to shed water. The roof of a house also sheds water, but nevertheless, it is wetted by the rain. The remarkable thing about the duck's back is that the water doesn't wet it.

A number of common things have the property of not being wetted. Mercury doesn't wet glass and water doesn't wet oiled silk. It doesn't wet lycopodium powder or zinc stearate, which can be purchased at the drug stores in shaker-top containers and has now become a familiar material in the household where it is used for toilet purposes. Water doesn't wet fats, which are mixtures of glyceryl stearate, palmitate, oleate, and similar substances; and it is well known that it doesn't wet the stearates, palmitates, and similar salts of the common metals, such as zinc, copper, and lead. It is lead oleate which causes surgeon's plaster to stick to the skin and, at the same time, makes it resistant to the effects of moisture.

To pick up a silver dollar from the bottom of a pail full of water without wetting the fingers or hand while doing it is an amusing experiment. The feat may be accomplished easily if a generous amount of lycopodium or of zinc stearate is sprinkled on the water before the attempt is made.

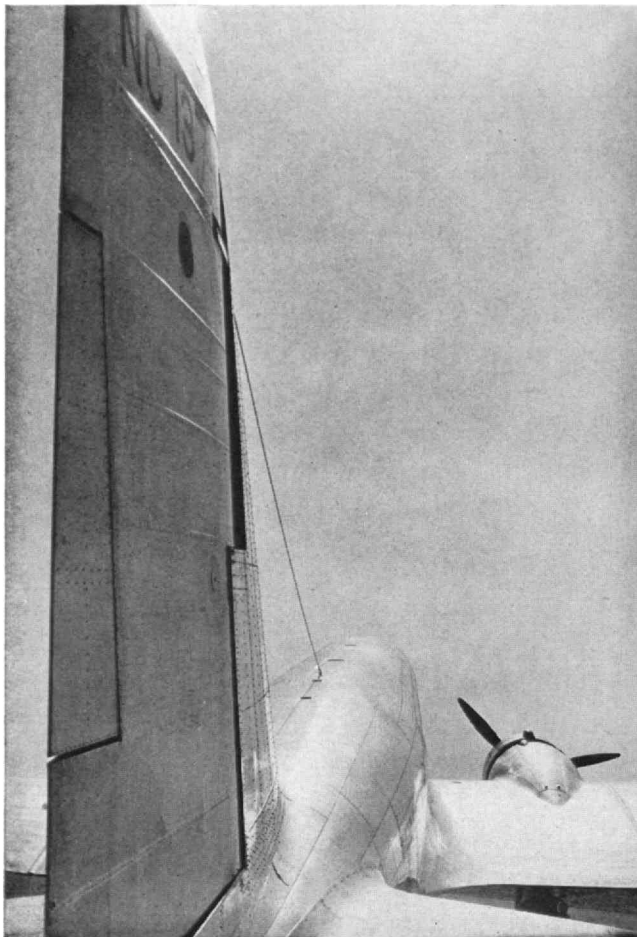
The fact that brick walls absorb water presents a serious problem to the architect. Moisture gets through them. The bricks, made from burnt clay, are always somewhat porous and contain capillary passages which retain moisture and transmit it into the interior of the wall. The mortar, which commonly comprises about 20% or 25% of the wall, is made from lime and water with the addition of sand and, sometimes, of hair or other binder. It is wet to start with. During the process of

setting, the water evaporates and the quicklime combines with carbon dioxide from the air to form calcium carbonate, a dry substance, but one, however, which may be wetted. More than 50% of the water which gets through a brick wall is reported to be carried by the mortar.

Architects have met the difficulty by what might be called mechanical devices: by building into the walls, behind the outer course of brick, flashing of lead or other metal, or, as in certain recent construction, a flashing of waterproofed canvas. They have lately combated the difficulty by chemical means — by a waterproof mortar (it sounds like a contradiction in terms) which contains calcium stearate or calcium soap, a material which sheds water like zinc stearate or the back of a duck.

Fats, being mixtures, as already noted, of glyceryl stearate, oleate, palmitate, and so on, are attacked by hot solutions of alkali; glycerine is liberated and the fatty acids combine with the alkali to form soap. If the alkali is soda, the result is hard soap; if potash, soft soap; if lime, calcium soap. Now, quicklime produces much heat when it reacts with water — here is our hot alkaline solution — and the slaking of quicklime with water is precisely the process of the preparation of mortar. *Et puis, voilà.*

While the burnt lime is being ground for shipment, an atomized fat, animal or vegetable oil, is introduced in small amount and mechanically mixed with it. When the lime is slaked at the site of the building operations, the fat is converted into calcium soap. When the mortar sets, it is waterproof. The procedure is as simple as the egg trick of Christopher Columbus, so simple, indeed, that one wonders how it happened to be thought out. It constitutes another example of that simplicity which in science and invention is closely akin to genius.



The beauty of functional form in engineering design. ABOVE. The modern transport plane. RIGHT. Shaping a blower rotor for a Diesel engine

Toward Quicker, Stronger Concrete

AS the chemists improve mortar, other investigators are aggressively studying ways of producing concrete that dries more quickly and that is stronger and more dense. By conventional methods the water used in mixing concrete is eliminated only by initial hydration and subsequent drying, a process which always causes shrinkage, and frequently induces cracking and weakening in the structure of the concrete. The time required for hardening, which is so directly related to water loss, is, furthermore, an economic factor of great importance in the speed and cost of construction.

The trend of research is toward elimination of coagulation of the fines, which causes insufficient hydration of the cement used, and the elimination of "water gain" around the aggregate. The methods of attack include three possibilities: elimination of excess water either by dispersion, evacuation, or pressure.

Successful results have already been accomplished by dispersion methods, and recently Karl Paul Billner, a civil engineer of New York, demonstrated at Yale University a method of extracting water from concrete by a vacuum process. Concrete made by this method is said to harden in less than half an hour and, because of the pressure induced by vacuum withdrawal of water, is compacted to a mass of unusual

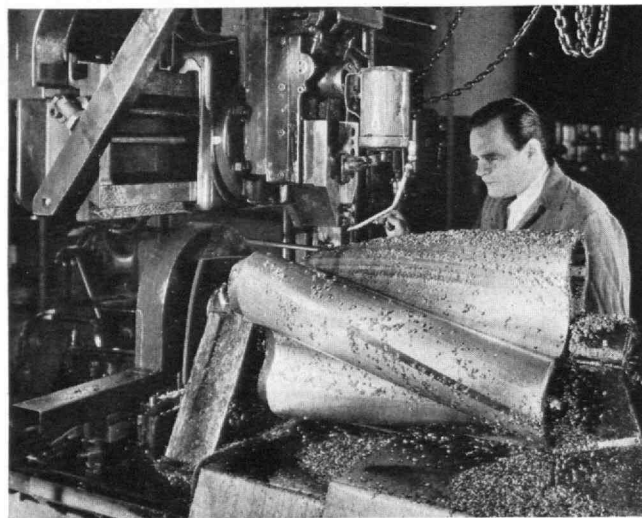
density. The densifying of concrete by pressure, the third possible method, is an old process, yet worthy of further study.

In the Billner method, which must face the tests of practical field operations and the scrutiny of the chemist, an air-tight cover is placed over the concrete mixture immediately after it is cast and a vacuum created between the concrete and the cover. The excess water thus drawn from the plastic mass is disposed of in a collecting tank. Concrete produced by this method is claimed to be from 30% to 100% stronger than that made by the conventional methods of slow drying.

Many engineers, despite the Billner demonstration, still feel that dispersion holds the greatest promise for practical field use, and extended research is under way to determine feasible ways of applying it.

Tomorrow's Shingles

FROM Britain comes a new development in the asbestos-cement field which, if costs are reasonable, may be of importance to the building industry. In spite



Patbanks

of all their good qualities, thin asbestos-cement sheets, as now made, are unquestionably brittle. The British invention, by a Mr. Cyril Froude Langworthy, undertakes to correct this by the use of a central core of 28-gauge, normal, galvanized steel. This core is stabbed with holes on one-quarter inch centers and then dipped in bitumen. Asbestos-cement composition is performed by the usual methods. While wet it is applied to both sides of the stabbed steel core and the whole is subjected to a pressure of two tons per square inch. Colors and textures usual in the industry are, of course, readily obtainable.

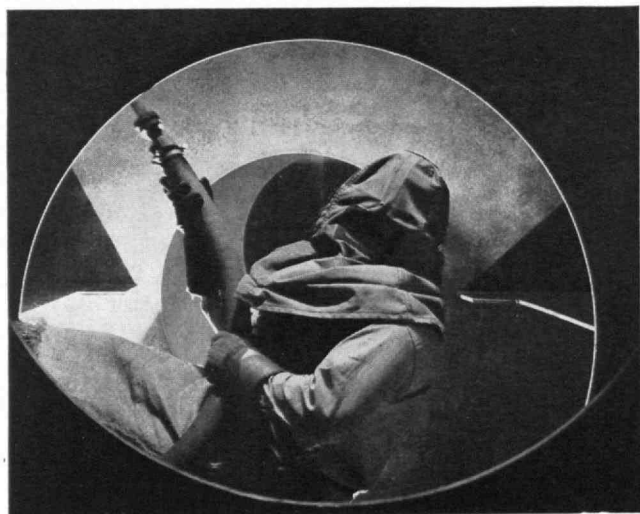
The product has emerged from the laboratory and costs have been tested on a commercial-sized plant, but are not yet quoted. It will be marketed in Great Britain under the name Durasteel, beginning this month. No effort has yet been made to introduce the product commercially in this country, but advance samples are strong and most attractive and indicate that the sponsors have quite likely obtained a fireproof, acidproof, noncorrodible, and permanent roofing

material of unusual promise. Like so many developments of this kind, the final test will be made in the bookkeeper's office.

Strength by Vacuum

OTHER adventures in a vacuum, in addition to that of concrete (page 88) and of electricity (page 101), add further proof of the versatility of vacuum technique. Aluminium-bronze die-castings are being made by the Aurora Metal Company by means of a vacuum system of filling the dies. Heretofore, the presence of aluminium oxide in castings made by older methods has somewhat limited their usefulness.

Instead of forcing the molten alloy into the die, the conventional procedure, the method developed and patented by the Aurora Metal Company draws the alloy into the die by suction. The process is, however, more complicated than a simple reversal of technique, for the success of the method depends upon careful design of the dies to eliminate hardening of the alloy in thin sections before the entire cavity is filled. This entails accurate



Galloway

knowledge of the degree of exhaustion necessary for filling dies of various types. The method has been successfully employed in both small and very large dies.

The elimination of impurities which form on the surface of the metal in the melting pot is made possible by filling the dies by the vacuum method after they are partially immersed in the molten metal. The dies are handled by specially equipped air hoists which center over the molten metal and lower them into it until the entrance gate at the bottom of the die is considerably below the surface. Only then is the die evacuated to permit the uncontaminated metal to flow into every crevice of the pattern. The new castings are intended especially for uses where their characteristic strength and resistance to corrosion are important.

Biochemical Age of Foods

THE delicate flavor of your breakfast egg may be due, not to its being chronologically fresh, but rather to the fact that its biochemical age is one of extreme youth.

It is the biochemical or physiological age that is important in food preservation, notwithstanding the popular opinion that time is the essence of freshness.

Such is the statement, in substance, made by Dr. Bernard E. Proctor, '23, of the Institute's Department of Biology and Public Health, in his report as chairman of the committee on foods at the recent meeting of the American Public Health Association at Milwaukee.

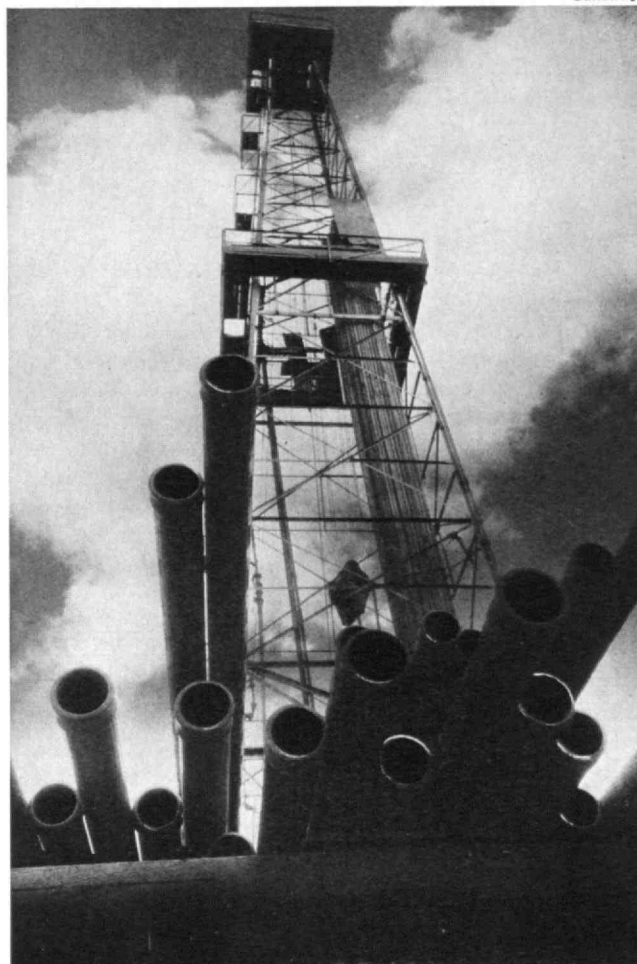
"An egg laid only a few days," said Dr. Proctor, "and improperly stored may be of inferior quality to one laid the same day but carefully and immediately cooled and maintained under optimum conditions of refrigerated storage for several months.

"As time goes on, and more is learned about such physiological changes, it would seem that the more logical method for the determination of quality and edibility of cold-storage products would be the evaluation of such changes, together with the direction of more attention to the preparation of such products for storage, and their actual storage conditions, rather than emphasizing storage time, or chronological age, which may sometimes be a fallacy."

Biochemical age marks the extent to which the processes of maturation have progressed in fruits and vegetables or the progress of catabolic enzymes, together with the activity of bacteria, molds, and yeasts in animal products.

Intimate studies of modern industry. LEFT. Shot-blasting metal plate. BELOW. Oil-well casing and derrick

Galloway



Dr. Proctor called attention to recent studies made to determine the best storage conditions for particular foods, especially fruits, vegetables, and meats, which showed, he said, that optimum conditions of temperature and humidity differ to a considerable extent. "The storage of foods in the presence of controlled atmospheres containing gases, especially carbon dioxide, has been found desirable," he said, "in respect to fruits and meats and has recently come into use in English warehouses and ships."

Referring to recent studies of the nutritive value of foods, especially with respect to their vitamin C content, Dr. Proctor finds that the evidence at hand "indicates that refrigeration of foods containing vitamin C tends to conserve such content in comparison with similar products not refrigerated during cold storage, although periods of months may diminish the concentration in some foods unless very low temperatures are employed."

Digressing for a moment into the realm of the end-to-end statistician, Dr. Proctor computed that refrigeration capacities now in use in this country, as recently reported by the American Institute of Refrigeration, would approximate a chamber 50 feet high, 20 feet wide, and 140 miles long. Freight-car refrigeration adds another 45.5 miles, ships 22 miles more, and domestic mechanical refrigeration yet another 4.8 miles. Not counting ice boxes in homes, stores, or restaurants, the 42 million tons of artificial ice, or the tremendous quantities of natural ice, the country's total of refrigeration facilities would, therefore, approximate a structure 50 x 20 feet in cross section and more than 200 miles long. Even John Bunyan would doubtless say that this is a pretty capacious ice box.

Research Tour — An Intimate Log

"INDUSTRIAL research has been so profitable to many American industries," once wrote the late Arthur D. Little, '85, "that the general concept of the value of research has become recognized by most alert executives. There is not, however, the same unanimity of opinion on how to conduct industrial research." To afford bankers and executives opportunities to see first-hand how successful research is conducted, the enterprising Division of Engineering and Industrial Research of the National Research Council yearly conducts a tour of leading industrial laboratories. The following log, indited by a Review observer, records some of the high lights of the most recent of these tours, and indicates the extent to which the small group of invited executives were able, in the words of Maurice Holland, '16, Director of the Division, "to peer over industrial horizons."

The itinerary included General Electric, Eastman Kodak, B. F. Goodrich, Gulf Refining, Mellon Institute, and Bell Telephone Laboratories.

GENERAL ELECTRIC

A creaking night liner sails from New York and docks us on a crisp morning at Albany, whence by bus we reach Rice Hall, Schenectady, at an early hour. Here we are confronted by a formidable staff of G. E.'s biggest scientists ready to occupy our morning with a series of ten-minute lectures and demonstrations. As we listen,

we experience a feeling reminiscent of the lecture halls of our undergraduate days. Dr. Willis R. Whitney, '90, retired director of the laboratories, speaks briefly. Laurence A. Hawkins, '99, executive engineer of the laboratories, presides charmingly. Salient items on program:

1. *The capillary lamp*, by Dr. Saul Dushman. About the size of a small fountain pen, this lamp — consisting of a quartz tube containing a drop of mercury and two electrodes under a pressure of 40 atmospheres, and requiring very little energy — develops as much light as a conventional lamp of 200 watts. Its color, not unlike that of the more familiar mercury-vapor lamp, is unpleasing for home use by current standards, but Dr. Dushman suggests that fluorescent materials might correct this. Taking another tack, he improved the color by introducing a screen of rhodamine. All this seems important because apparently no further fundamental improvement is possible in the filament lamp. Experiments with still higher pressures may confirm the augury of a new form of lighting already suggested by this demonstration.

2. *The Alnico magnet*, by W. E. Ruder, who tells the story of constant lessening of transformer losses by improving the qualities of magnetic alloys — a curve of improvement that, despite tremendous percentage gains since the introduction of silicon in 1905, still betrays no asymptote. The new magnetic alloy of aluminum, nickel, and cobalt was first developed by G. E. in the search for a heat-resisting alloy and was improved by research at Tokyo University. Small magnets are handed around, magnets that will lift 60 times their own weight and will tear to smithereens the watch of the unwary handler. A more popular demonstration in the corridor shows a radio cabinet suspended by a small Alnico disk.

3. *Direct-current transmission equipment*, by Dr. A. W. Hull. Long known as a more efficient method of long-distance transmission than a-c, d-c has been in partial discard because procedures available for producing and controlling high voltage have been costly and impractical. The development of a constant-current system of transmission, together with new metal Thyatron tubes for controlling the necessary high voltages, now suggests a return in the future to d-c transmission with inestimable effects on the possible widespread distribution of power from single large sources.

4. *Thin films*, by Nobel Laureate Irving Langmuir. In excellent form, he describes his latest venture in pure science, a venture in the production of monomolecular surface layers of such substances as stearic acid on such substances as water; layers of which the surface may behave as a two-dimensional gas, liquid, or solid; layers produced by the time lag between the condensation when molecules of vapor first impinge on the surface of a solid or a liquid and their subsequent evaporation; layers that may be removed in their pristine thickness by the simple expedient of immersing and withdrawing a metal plate, the film removed being, of course, double the original thickness; layers which, in multiples of 20, become thick enough to be measurable by light waves; layers, the study of which may in future be of great significance in the understanding of lubrication and adhesion phenomena or of electronic emission from cathode surfaces in vacuum tubes. Here, then, we see pure scientific research making ready for industrial change.

After a liberal lunch at Mohawk Country Club, we make a plant visit that seems somehow unimportant as compared with the morning. Almost everywhere in the

plant there is now being built the biggest piece of this or that electrical apparatus, and most of these are destined for Boulder Dam. In the ceramic department, we see the beauties of industrial porcelain, new inspiration for architects in the functional perfection of pagoda-like, five-foot insulators or the simpler charm of smaller, ordinary ones. In the mercury-vapor steam plant, we see tubes vanishing in the lofty dimness of a truly modern building, while the lighted floor reveals a control board to shame the wildest intricacies of H. G. Wells or Hollywood.

EASTMAN KODAK

We are impressed by the purposeful cleanliness of Kodak Park; a laboratory over which falls the lengthening shadow of a great man (Eastman) illumined by the vitalizing presence of another (Dr. C. E. K. Mees). In the auditorium, Dr. Mees makes dyes before our eyes and talks as he does it, while aphorisms fall freely from his lips. "Research is a natural process; nature is prodigal; research should be prodigal." "The problems of research are to know what to do — and when to stop." We learn of the contribution to industry by Eastman's organic chemicals division, a department which now makes more kinds of rare chemicals than all the German plants put together, which registers a profit on but 500 of the 3,000 odd items on its list, which, nevertheless, intends to increase the variety of items, profitable or not. We see with Dr. Mees the first results of Hollywood's experiment with Kodachrome moving-picture film, an invention by musicians, not scientists, which has had such startling success since its first introduction to amateurs in April of this year. Breaking into groups, we stop in spotless laboratories, where scientists ably expound what they were doing yesterday and will be doing tomorrow. We note:

1. *High-vacuum research.* Dr. K. C. D. Hickman reveals to us the science of emptiness, tells us the engineers' perfect vacuum is really a highly congested area if viewed by a molecule's eye, shows us how that space can be progressively depopulated until a gregarious molecule may feel distinctly ill at ease, shows us an end result when drops containing vitamin A ooze slowly from the end of a condenser into the last beaker of a chain of apparatus to whose beginning funnel raw cod-liver oil is fed — strange business for Kodak Park!

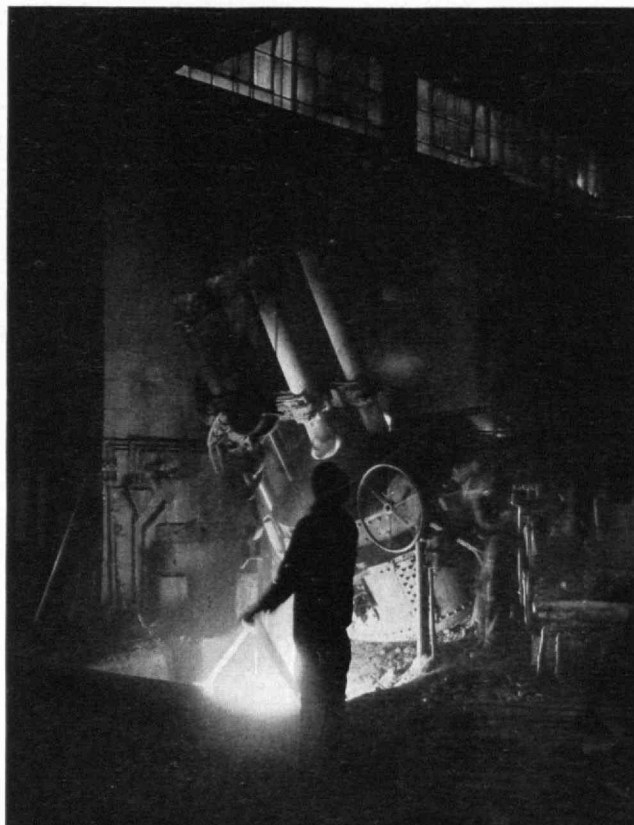
2. *Solution studies.* Mr. Ballard demonstrates the use of a beam of light to reveal the motes of silver bromide in an oversaturated solution and how, to make sure these motes are silver bromide and naught else, the water solvent is subjected to long treatment to make it dust-free, one wondering the while what dust-free water tastes like.

3. *Soft x-rays.* Mr. Wilsey shows us a new type of discharge, revealing qualities of thin fabrics, utterly ignored by their stronger and more conventional brother rays, and, too, an x-ray room *de luxe* whose lead linings are concealed by wood-paneling.

4. *Heat-developing papers.* Under ordinary light, Mr. Vanselow exposes his papers to ultraviolet and, still under ordinary light, develops the photographic image by applications of a flatiron.

At day's end, we return to the lecture hall to see ourselves in Kodachrome and, humorously enough and much to the disgust of some of the staff, Kodachrome such as the amateurs among us might readily expect to pro-

duce. While dining with Dr. Mees, we have the pleasure of hearing Sears' General W. I. Westervelt give his definition of worth-while research: "Any subject, the study of which would lead to an elimination of time-space constraint, is worth while." Summarizing conclusions, we marvel at how little of the work we have seen bears any first-hand relation to the miles of amateur film that some of us saw being coated, and we feel that the broad implication stands clear at every stage that color photography moves rapidly forward, that, except for certain specific artistic effects, the photography of a near morrow will abandon monochrome forever.



Ptaket

An electric furnace pouring steel

GOODRICH

Again we come to a lecture hall, simpler than before, suggesting that perhaps Goodrich does not show its research so often. Most spectacular of the results of Goodrich research:

1. *De-icers for airplane wings.* Bags of rubber which, expanding and contracting as compressed air is fed them, break up the film of sleet or ice and remove the devastating and suddenly imposed extra load — with a newer development, an attack on the last stronghold of ice on heavier-than-air craft, glycerine or oil films for the propellers, films that cause the ice to form in small sections that are thrown off by the rotating force of the propeller. We see Goodrich's refrigerated wind tunnel for this study.

2. *Vulkalock.* A bonding agent, whose accidental discovery is described to us, is demonstrated in the preparation of rubber-lined receptacles for corrosive materials.

3. *Koroseal.* The synthetic chemists' answer in the form of a polymer of vinyl chloride to the poor, though improving, aging properties of natural rubber is an elastic hard

polymer, pulverized to a tough jelly, sheeted on sheet mill rolls, possessing half the elongation of rubber of the same hardness and being more oil resistant. Although the present application is chiefly in lacquers and acidproof paints, the specimens suggest many other possible uses.

In the afternoon we make a plant visit that, in contrast to that of G. E., seems to overshadow the work of the laboratories. It brings out the amazing contradiction between the almost perfect adaptability of rubber to many uses and the huge forces that rip or break it asunder and remold it nearer to man's desire. Some of the forces: heated knives cutting hard bales of rubber into sizes fit for the plasticators as easily as a knife cuts soft butter; plasticators twisting, twisting, twisting the material into a tremendous continuous rubber cruller; a modern sans-culotte, stripped to the waist and bare of leg, slicing the cruller into six-foot lengths with an ominous cleaver — the lengths rolling over and over again like so much molasses candy on seven-foot warming rolls; tubes threading endlessly from extruding machines; a rubber fish-bowl, where inflated tires bob through lighted water for inspection; interweaving, fast-moving soldier-spindles of the hose-making machine; air conditioning and Bourke-White beauty in a cloistered creel room, whence 1,750 separate strings pass in arachnoid perfection through the floor to the cord machine; shattering explosion of a truck tire that lets go under test as we tiptoe by; the anomaly of rubber tires getting better and better until they slowly reach toward the life of the automobile they cushion; the many sizes and shapes of tires that we seldom see; rubber springs for street cars in Kansas, bespeaking at the same time, perhaps in a long future, a softer ride on American rails; all this recalls Waldemar Kaempffert's question: "Is it not true that rubber has been for you almost too perfect, almost too adaptable a material?"

GULF REFINING

We drive 15 miles by motor along the beautiful Allegheny to Harmarville and the unusual, new laboratory of the Gulf Refining Company, far from confusion of plant or city, with buildings that are low-cost, functional, with no nonsense about them, but which, arranged on three sides of a campus grass plot and with some decoration in the plastic concrete of which they are made, attain the beauty of propriety and repose. Here, perhaps, is industry's newest and most modern laboratory, into which the staff moved just this summer but which is even now operating at full steam — testi-



General Electric

Radiograph, showing slight variations in the opacity of flowers

mony enough to the ingenuity and vigor of Dr. Paul Foote, its director. There follows a brief introduction in the lecture room, where we admire many-colored murals made of synthetic plastic which fool even the close inspector into thinking they are specimens of lacquered copper, aluminum, or other bright metals. Then, as at Rochester, we make a tour of operating laboratories, where some of the most interesting things are:

1. *High-pressure gauges.* New devices built substantially to withstand the sort of roughing they may get at the bottom of an oil well and yet to register pressures within two or three pounds in the 3,000-4,000-pound range.

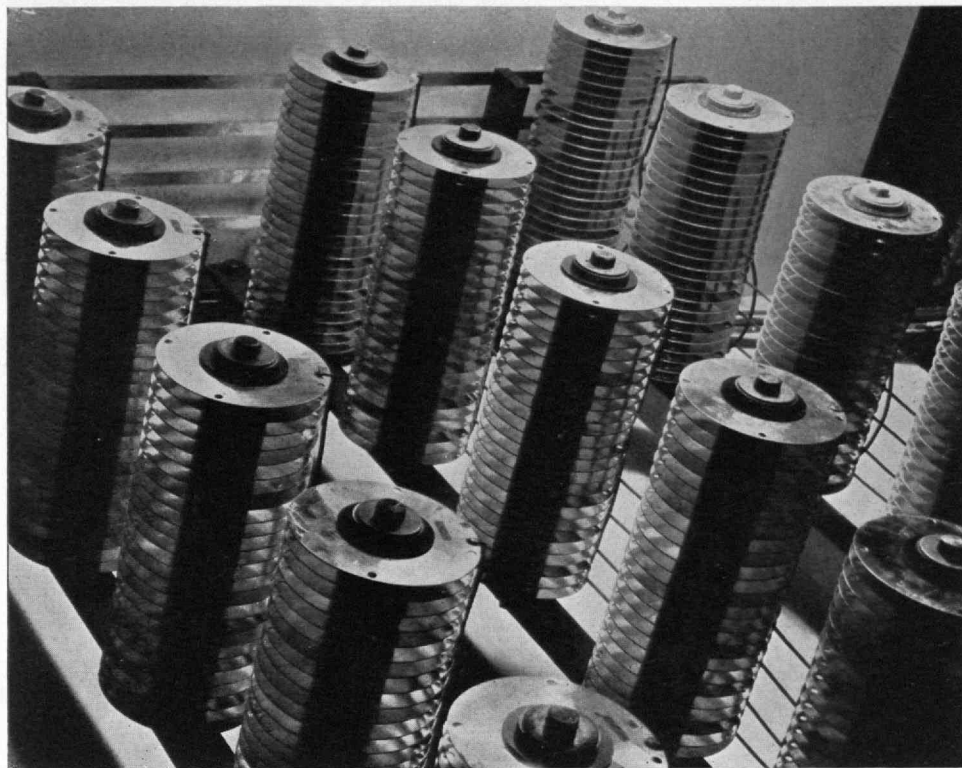
2. *Triple-tandem deep pumps.* Designed on a rotation-against-pressure principle, these will operate successfully at 11,000 feet below ground and will be useful in reviving spent wells.

3. *Field demonstration of geophysics.* Not only the spectacular seismographic method is used but gravity and magnetic methods, including an instrument from Budapest that will measure the attractive force of the sun or moon.

4. *Insecticide tests.* We see a breeding room where maggots are well fed till they become high-class specimens of blowflies. Their destination, in lots of 100, is a lethal chamber for testing the various insecticides. "Flitted" flies, we note, die of creeping paralysis.

5. *Gasoline research.* This implies that important modifications of our present fuels are well on the way.

From Gulf, then, we gain an impression of serious research, closely allied to the industry it serves, prospecting few bypaths, handsomely housed and handsomely carried on under the pleasantest of surroundings. From Gulf, too, comes a picture of the amazing vitality of industrial research, for this laboratory is a depression



Shades and shadows. Rectifiers for radio broadcasting

Margaret Bourke-White

product. Today it occupies four times the space, employs six times the staff (present staff 600) that it did in the grim, first days of 1930.

MELLON INSTITUTE

After a copious lunch, we go to Dr. E. R. Weidlein and his Mellon Institute, not yet moved into its magnificent new Erechtheum of Research which will be dedicated next spring with appropriate ceremonies. Unlike the laboratories previously visited, this one has no central focus and contains, in its many cubicles, research fellows working toward highly diversified objectives as set forth by the individual industries which have set up the fellowships. Largely commercial, among the most interesting of these are:

1. *The Plaskon Scale.* A product for the grocery store, by Toledo Scale Company, the scale is cast from a relatively new plastic of the urea-formaldehyde variety, the largest plastic casting yet made for anybody. The scale has an aluminum index to replace the old paper one, bringing the index nearer the glass and reducing error due to eye position. The scale weighs about a third less and is altogether more sightly and efficient.

2. *Flake Coffee.* In grinding coffee certain gases are released. If these are confined with the ground coffee, they slowly draw with them, to the top of the can, certain essential oils of importance to flavoring; hence "dating." Flake coffee, however, is rolled immediately upon grinding to express the gases quickly, and the flaked material, still containing its essential oils, will keep indefinitely, it is hoped, in a package. Iced coffee, too, may be made of this material without benefit of hot water.

Departing from Mellon Institute, we are, first of all, impressed by the contrast between its classic new home and the modern home of Gulf's laboratories and, secondly, by the rapidity with which the Mellon research is translated into commerce; impressed, too, by Dr.

Weidlein's statement that, since the Visking sausage coating was developed at Mellon, 500 miles of this casing reel from the machines every day—a continuous flow of sausage casing—a never-ending daisy chain to be hung around the neck of applied research.

BELL TELEPHONE

On the last day we come to Bell Telephone Laboratories and into the stimulating presence of Dr. Frank B. Jewett, '03, their great director. Here we undergo a combination of lecture-laboratory visit in perhaps the most effective demonstration of all. As is usually the case, the most dramatic demonstrations, like that of binaural sound transmission, have already been described. Outstanding newer impressions are:

1. *Improved vacuum tube filaments*, as described by Dr. O. E. Buckley. In 1916 the filaments required 6.5 watts per tube and had a life of 1,000 hours. Through progressive improvements in the material of the filament, by 1921, only 4.5 watts were required and the life was 10,000 hours; by 1927, the standardized filament required 2.0 watts and lived 18,000 hours; today, though not yet in use, a new filament uses but 1.0 watts and lasts more than 25,000 hours. Dr. Buckley makes the sensational statement that all the cost of research of the laboratory could be paid by the savings made through the improved filament alone!

2. *Preview of the new telephone instrument*, of which but a few sets are yet in use and which is probably two years in the future, a set with better looking and simpler transmitter, with a smaller induction coil and a condenser which will fit the instrument case so that the only wall connection will be about the size of a safety-match box. The instrument has a bell of two different tones and optional wood or metal clappers, a quieter dialing apparatus, an efficiency of transmission as compared with the instrument which preceded the hand set equal to the change in horse power from an early to a modern automobile.

3. *The call announcer*, which transfers a dial call into a spoken number for the use of manual offices, and the curious diction that the Bell System apparently regards as standard.

Finally, at dinner at the Waldorf-Astoria with Dr. Jewett presiding, we enjoy an off-the-record discussion which will never reach the printed page. We arrive at the overwhelming conclusion from a busy week that, despite the panic of bankers and politicians and public, research workers have steadily and faithfully kept to their work, that the stimulus of increased confidence and freer money expenditures will release to the public, in no very far future, devices, (*Concluded on page 122*)



"Past the great glaciers that flow down the mountains," north of the Stikine River, the second day of flight

Flying Four Thousand Miles

*Does a Tropical Valley Exist
Near Devil's Gorge?*

BY CHARLES

LAST summer an aërial flight of some 4,000 miles, which commenced at Prince Rupert, B. C., and ended at Edmonton, Alta., was undertaken by myself and three associates for the purpose of inspecting the work of several geological parties working in Cassiar, B. C., the north arm of Great Slave Lake, and Beaverlodge, Athabasca Lake. In addition, observations and investigations were made into a number of questions concerned with the administration of the Northwest Territories on behalf of the Council of the Northwest Territories, of which I have been a member for 15 years.

A third subject of inquiry was to determine what happens to the Rocky Mountains in latitude 60°, where the Liard River cuts across them. These ranges, which run up through the United States and Canada seem to

die down when they strike the Liard River, and it has always been a question with geographers whether or not they continue north of that river and merge with the Mackenzie Mountains, or whether the Mackenzie Mountains are a separate range detached from the Rockies.

The flight was of intense interest to me, because, with the exception of unknown territory north of Liard River, I had traveled over practically every foot of the way on snowshoes or by canoe, taking, however, some years to do it. The present trip, including some six days' delay on account of bad weather, was made in 17 days.

It is difficult to imagine a more enjoyable trip, with congenial companions, a highly competent crew, and a good plane. Never at any time was there any thought



The party and their Fairchild 71. Left to right: W. Sunderland, mechanic and photographer; C. H. Dickens, pilot of Canadian Airways; A. D. Maclean, superintendent of the Civil Aviation Branch of the National Defense Department; and the author



Dease Lake on the headwaters of the Liard River, northern British Columbia. This was reached after passing Telegraph Creek and crossing the Pacific Arctic divide. The Grand Canyon of the Liard was photographed from Devil's Gorge to Hell's Gate



The small post, Telegraph Creek, becomes diminutive from the air, but the Stikine River maintains its majesty

Over Northwestern Canada

CAMSELL

What Happens to the Rockies North of Latitude 60°?

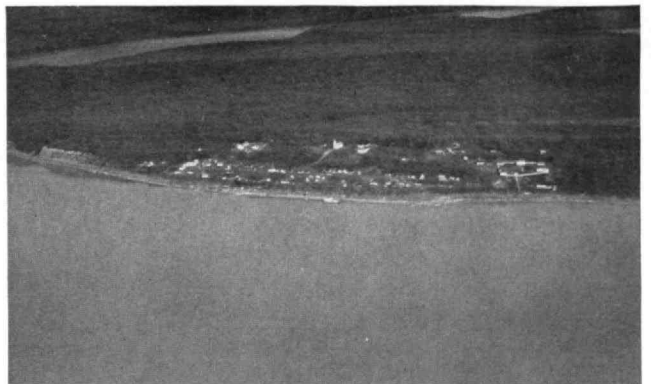
of danger or risk. Weather reports were obtained at a good many points. We never had to camp out, because we made use of the trading posts every night, and the hospitality of those posts was such as to be at times embarrassing because of their generosity. Particularly was this true at those points which were away from the regular routes of airplane travel, such as McDames Creek in the Cassiar, Fort Liard, and Coppermine on the Arctic Coast.

The detailed results of our trip will be included in an official report to the Government, but I can say now that much first-hand information was obtained that will be useful in the administration of the affairs of the Northwest Territories. We discovered what happens to the Rocky Mountains north of latitude 60° in south-

eastern Yukon, and this information will be used to complete a large-scale relief map of Canada now under construction by the Geological Survey at Ottawa. Our observations and airplane photographs will show that the Rockies, which run as a continuous group of ranges from southern United States through Alberta and British Columbia, die down along the strike into a plateau country north of Liard River, where for many miles to the north, northwestward, few of the rounded summits extend above the timber line. Two degrees to the northeastward, however, and across a relatively low country, the Mackenzie Mountains spring up as if offset from the Rockies, and these extend northward as a gradually broadening belt of mountains which also curve westward to cut off the plateau country on the north.



Fort Simpson at the junction of the Mackenzie and Liard Rivers, where the party landed after a study of the Rocky Mountains beyond latitude 60°. The author was born at Fort Liard, his father being a Chief Factor in the Hudson Bay Company



Fort Norman, a fur-trading post and the source of the oil which is used as fuel for the operations at Great Bear Lake where radium ore is mined. Dr. Camsell was with the expedition that in 1900 spotted cobalt bloom at Great Bear Lake



Above. The most northerly point of the trip, latitude 68° , a degree and a half inside the Arctic Circle. The few white residents and a group of smiling Eskimos were most hospitable. Below. The flight included a visit to Fort Smith, the capital of the Northwest Territories, on the Slave River



For many years the idea of tropical valleys in the Liard River country has stimulated the imaginations of newspaper and fiction writers, and it is unfortunate that we have to explode those ideas. The tropical valley on the Liard River is associated with the name of Tom Smith, a Yukon trapper, and his daughter, Jane, who lived for a number of years at some hot springs near the Devil's Gorge. With two years' catch of furs, Tom Smith left his cabin at the hot springs in a boat to trade his furs at Fort Liard. He portaged over the Devil's Portage, ran the Rapids of the Drowned, and successfully passed

through Hell's Gate. In fact, all the dangerous water on the Liard River was behind him when his boat was swamped in a whirlpool, his outfit was lost, and he himself was drowned. His daughter got ashore and by some means found her way to Fort Liard, a hundred miles or more away. She died only last year at Hay River and could never be induced to tell much of her experiences.

Our first flight down the Liard River, we noted some open patches in the timber that looked like springs and as these were situated near a point where I had camped in March, 1898, on my way to the Klondike, and where we had found some springs, we landed near them on our second flight. After scouting along the bank, we found a trail running up on to the bench and through the woods. Following this for a third of a mile, we came to a broken down cabin with a tree across the roof. On the door of the cabin was a notice in block letters reading, "Moved to the Hot Springs," with a hand pointing northward. Following the trail farther in this direction, we came to an open meadow in which the vegetation was most luxuriant, but of a kind common to this country. Grass in the meadow was growing seven feet high and other vegetation was correspondingly rank. We could follow the trail through the meadow only by feeling for it with our feet and we frequently lost it. By scouting around the end of the meadow we again picked up the trail, and, after following it for two or three hundred yards, came into a beautiful grove of large spruce and poplar. In this grove were two log cabins with their roofs crushed in. A whipsaw, an ax, some pots, and empty tins were scattered about, and obviously the occupants of these cabins had left many years ago. There were many signs of both bear and moose about. A stream of clear, cold water ran nearby, and there were many old game and other trails radiating from the cabins. These seemed to lead nowhere, at least there were no hot springs nearby, and it was difficult making one's way through the thick undergrowth.

Examining the cabins more closely, we found a notice, evidently from Tom Smith, reading, "Leaving for Fort Liard," and this was no doubt (*Continued on page 119*)

The Route Followed

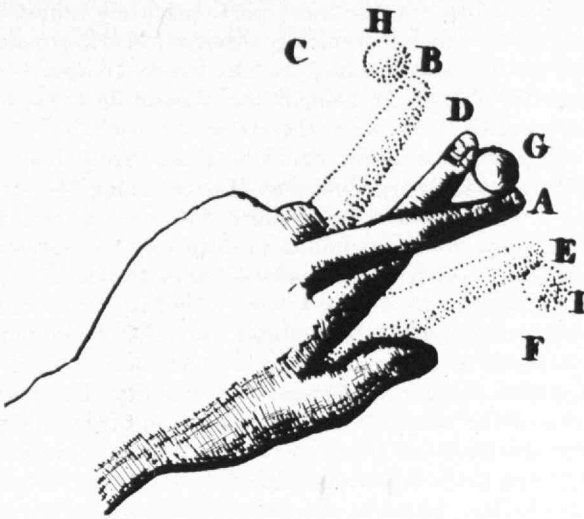
Leaving Prince Rupert, a stop was made over night at Wrangell, Alaska. From there we followed the Stikine River, past the great glaciers that flow down the mountains, almost down to the river, past Telegraph Creek, and across the Pacific Arctic divide to Dease Lake on the headwaters of Liard River. Following the Dease River to its junction with the Liard, we photographed the Liard River valley from this point down to Fort Liard on the eastern side of the mountains, taking a steep-angle, oblique photograph every minute and a quarter of the immediate valley of the river and particularly of the Grand Canyon which extends for 40 miles from Devil's Gorge to Hell's Gate.

From Fort Liard we returned westward, almost to Dease River, and, from an elevation of 10,000 feet, photographed two east-west strips of the unknown territory north of Liard River into which the Rocky Mountains were supposed to extend. A landing was made at some hot springs near Devil's Gorge, the so-called Tropical Valley. The next day we made another flight northwest from Fort Liard through this unmapped area toward

the headwaters of Beaver River and came out on Nahanni River at the hot springs.

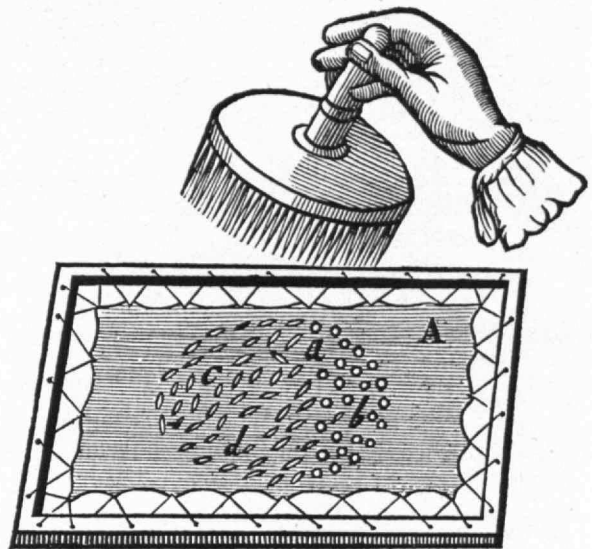
Having determined what happens to the Rocky Mountains north of latitude 60° , we flew down the Liard to Fort Simpson and thence to Fort Norman, where a visit was paid to the oil wells which supply fuel for the mining operations at Great Bear Lake. From Norman we then flew east across Great Bear Lake to Cameron Bay and spent a couple of days in examination of the silver and pitchblende properties there. A trip was then made to the Arctic Coast, at the mouth of the Coppermine River, where we reached our most northerly point at latitude 68° , a degree and a half inside the Arctic Circle. Here we were hospitably received by the few white residents and a group of smiling Eskimos.

Striking south, we stopped at Fort Rae to visit some geological parties there and thence flew to Fort Smith. From Smith, we cut across eastward to Beaverlodge on Athabasca Lake, where the mining developments were seen and a group of geological parties visited; thence on through McMurray to Edmonton.



THE PHANTOM MARBLES

"Aristotle's Illusion" typifies errors of the senses. Sensory signals convey false data to consciousness when transmitted in unfamiliar combinations. Crossed fingers touching a marble (G) in positions D and A have the same effect on thought as if in familiar positions B and E, in which latter case contacts with two marbles (shadowy H and I) would be required to convey the sensations received from crossed fingers. The illusion is vivid if the eyes are closed. Aristotle could not know that neuro-signals travel over wires at about 300 feet per second to a receptor panel (in brain) calibrated to relay nerve impulses to switchboards and mixing panels where neuro-waves are transformed into correct psycho-indications — if all goes well. See text, p. 100, and picture of *Apperceptive Errors*, p. 98



THE BRAIN RECORD AS SYMBOLIZED BY DESCARTES

The suggested explanation of memory is that nerve impulses arriving in combination from sensory sources are registered as a unit. Each of the pointers in the figure is analogous to the action of some one particular stimulus reaching the brain switchboard. The pattern in the brain tissues is represented by the combined effect of the pointers uniting as a single agency in the physical structure of the carding comb; whereas nerve impulses are united by time of arrival. The master record is used over and over for partial electrical transcriptions. It starts replaying as a whole whenever one of its sections — a, b, c, or d — is "recalled" by a cue-combination of nerve impulses that matches the characteristics of any one of the sections indicated.

See p. 117

Everything Improved but the Mind

The Need for Engineering Analysis in Mental Science

BY LYDIARD H. W. HORTON

THE beginning of the Industrial Revolution, or the Age of Machines, was a century in the future, although the era of modern science was already off to a flying start, when that mathematician extraordinary, Blaise Pascal (1623–1662), recorded his philosophical reflections. One of these virtually prophesied the day, now with us, of an abundant productivity frustrated by social dissensions: "The inventions of mankind go on from century to century, but the benevolence and the malice of the world remain unchanged." This affirms that men in their pursuit of happiness have applied ingenuity more successfully to the betterment of their tools than to the improvement of their dispositions!

Indeed, current history sustains the proposition that human control over *matériel* through the technology of industry and health services has unconscionably outstripped the techniques for dealing with *personnel*, whether in its social rôle or in the due exercise of the individual's powers of intellect and emotion. Yet this hoped-for art of applied psychology rejoices in a special name — psychotechnology — that hints at a de-

sirable parity with physical technology in the march of progress; but the discrepancy between the two is painfully evident in any attempted parallel between engineering tests and intelligence tests, or between the fabrication of machines and the building of character.

"Vice and virtue," it has been said, "are products just as well as vitriol and sugar." But the procedures from which vice and virtue eventuate are allowed to escape scientific observation to an extent that would bring shame and prompt reorganization to any industrial plant that so overlooked research into the details of production.

If "improving the mind" is to mean anything more than desultory study, the phrase must signify the cultivation of personality to produce better thought sequences and behavior patterns; these form the procession of phenomena that we recognize as *mentality*. There is no occasion to consider alleged obstacles in the way of "changing human nature." It does not need to be changed; only to be understood and treated con-
dignly. This is especially true of character, which is an integration of mental processes.



CONCEPT OF THE BRAIN-SWITCHING PATTERNS GROWS MORE PRECISE

These two drawings are over two centuries apart (Descartes, 1640, and William James, 1890) but their authors carried forward the concept of wiring schemes in the brain. The actual operations are shown here honestly enough, although in reality impulses do not follow just a few wires but travel correspondingly through a highly accurate and quick-acting felt work of insulated nerve fibers, capable of precision surpassing that of ordinary electrical machines

In the study of mentality, the official psychologies have neglected all-important phenomena as belonging to "abnormal psychology"; for example, trains of thought in emotion and sleep. The academicians prefer to accumulate statistical measurements for inductive treatment, all too exclusively. The value of this method, says Jevons, "might be established historically by the fact that it has not been followed by any of the great masters of science."¹ In any case, the result among mental scientists is a lack of common ground for deductions about the working of mental qualities. Small wonder, then, that the Wickersham Commission on Law Enforcement, seeking help from the "psycho" specialists, should throw up its hands and exclaim: "The foundations of behavior are in dispute."

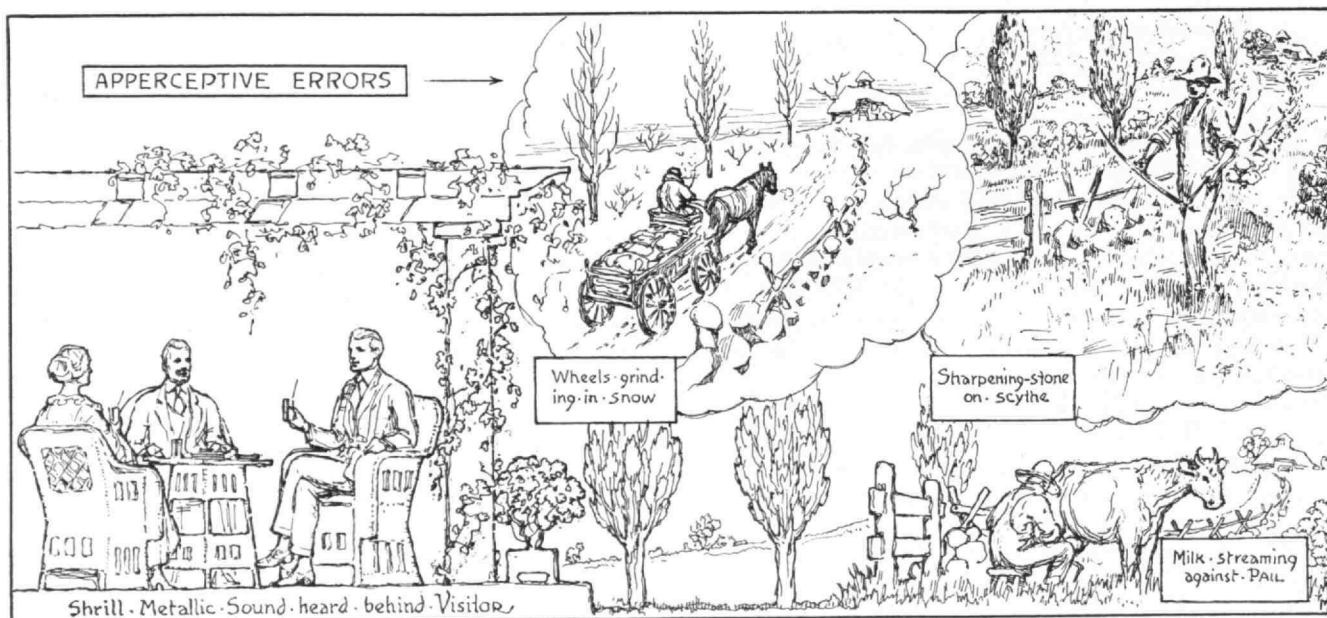
Psyche, graceful maiden symbolizing personality, tarries at a Tower of Babel amid the distracting jargon of warring Schools who shout their shibboleths. Trained

psychologists, for the most part, privately admit this confusion, which is ironically disclosed in "Psychology: Science or Superstition?" by Dr. Grace Adams. A few, notably William McDougall and Joseph Jastrow, have authoritatively sounded the alarm at this chaos.²

This state of affairs could be more surely remedied if it were widely recognized as "historical lag" — meaning procrastination in making apt use of available knowledge as well as failure in dispelling the hang-over of obsolete concepts and contradictory terminologies.

To begin with, the very word Mind is a crude finger post loosely planted in popular usage. Now shaking in the winds of doctrine, it points waveringly toward the directive or steering system of personality. The boundaries of the mental realm are vague, but it will help to find the frontiers if we adopt the familiar distinctions between Body, Mind, and Spirit, as the three sectors of personality. Mind is then viewed as something that intervenes between Body and Spirit — in common parlance, Body and Soul. But Soul has lost its pristine meaning of life-essence, of which the undeniable manifestations are seen in the growth of body cells and in the experience of awareness.

To illustrate how verbal misunderstandings prolong the historical lag, I would cite passages in an otherwise admirable textbook of dynamic psychology.³ The author essays to trace the "ill-repute of the concept of the soul" to historical origins. He makes too much of the "fear of the modern scientific mind lest metaphysics supplant physics." He blames particularly Descartes, "founder of modern philosophy [who] made the soul a spiritual thing that had no common qualities with material substances. He gave it a definite location, suggesting that it might be in the pineal gland. This, evidently, is a wholly impossible concept. It likens the organism to a machine."

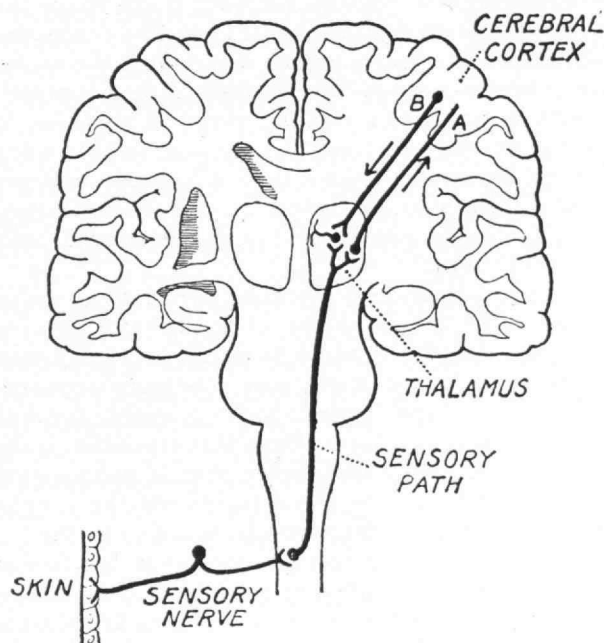


ATTEMPT TO RECOGNIZE STIMULUS SHOWS TRIAL AND ERROR OVERSHOTS

Milk streaming against pail with metallic sound. This instance arose from an attempt of the visitor, who is partaking of a cold drink, to guess the nature of the metallic sound while on the porch of a country house. The first response was affected by error from sensation of cold in hand; the second was close to the correct reaction; the third was a hit. This is brain processing by trial, error, and correction; it can be traced through minute intervals of time and gives clues to switchboard operations referred to in text

These supposed views of Descartes are classroom distortions of his statements, both by followers and by critics. The historical fact is that in 1637, Descartes found the soul already overloaded with meanings invented by those who dreaded what the new physics, personified in Galileo, might do to displace their metaphysics! All over the organism they posted and postulated "souls" to avoid mechanistic explanations.

Descartes did not impugn the soul as denoting a pervasive life principle, but he did offer mechanistic explanations for the functions of body and mind according to his reverent view that "the laws of Mechanics are the very same as the laws of Nature." As a device of exposition, he appealed to the age-old automaton interest by describing a manikin in which the functions of body and mind were made conceivable for the first time in engineering terms and were analyzed as "movements dependent on the arrangement of the parts — like a clock." This exposition laid the foundation of modern physiology and showed that psychology should be largely rebuilt on this basis. That Descartes made the pineal gland "the seat of the soul" is legend; what he focused there was consciousness, the field of awareness, as just one manifestation of the life spirit, interacting there with surrounding brain tissues. In the same sense, physiology today locates consciousness, so far as a field of force has location, in the newer portions of the fore-brain. "Mentality, in the usual acceptance of the term, is not distributed broadcast throughout the nervous system. . . ." ⁴



SENSORY SIGNALS ENTER BRAIN TRAFFIC WEBS VIA SWITCHES AT THALAMUS AND CORTEX

A sensory nerve passes into the spinal cord; a sensory path carries the effects of this impulse to the opposite side of the brain as far as the thalamus. Some of the impulses end in the thalamus and excite an awareness of sensation and appreciation of its affective qualities; other impulses pass from the thalamus to the cortex (A) to provide the information for discrimination which is acquired by experience, in some way recorded in the cerebral cortex. This discriminative activity of the cortex regulates and controls (B) the affective and emotional activities of the thalamus. (After Sir Henry Head, "Sensation and the Cerebral Cortex," Brain, 1918.)

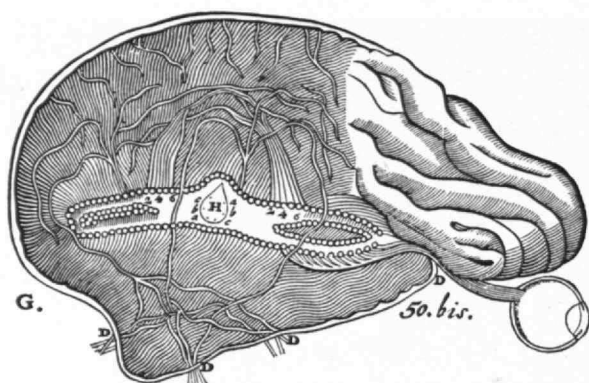


"ASSOCIATION OF IDEAS"

When John Locke coined this novel phrase in 1705, he did not mean normal, free-working linkages of ideas, but highly stereotyped responses. To illustrate: he told of a young man who diligently practiced dancing steps near a trunk that happened to stand in the room where he did his exercises. Later, the dancer found he could not perform elsewhere unless the trunk, or some object like it, was at hand. Association of ideas now means any hook-up of experience or memory, while a conditioned reflex means stereotyped response, as above, to fixed signals

The outcome is the contemporary doctrine of biopsychism which teaches that the course of thought and of corresponding nerve operations can be mechanistically accounted for, clearly, as in tracing a sequence of events through radio apparatus; while religious questions about the soul need offer no dilemma.

Lest biopsychism seem irreverent because it tends "to liken the human organism to a machine," let me record emphatically that comparisons between man and engines, or "prime movers," is what the most distinguished philosophers have been interested in nothing but! Instead of Aristotle, who gave physics its name, being presented as a mystic, he should be visioned in the act of winding up the springs of a toy vehicle ("the little chariot that moves by itself") and setting it down to run in a circle, "because its wheels are unequal in circumference, and the smaller becomes a pivot, as we see in uneven cylinders." And he exclaims, "It is absolutely thus that animals [including man] do move. The instruments of this motion are the apparatus of the neuron [muscles and tendons] and the apparatus of the bones. The bones are in some way the wood and the iron of the automata; the neurons are like the springs which, once released, stretch themselves and move the machines." ⁵ In like vein, he described reminiscence (memory recall) as articulated movements, within an unknown thinking substance — not necessarily a material medium.



FIRST DIAGRAM OF BRAIN SWITCHBOARD
AND MONITOR DEVICE

This cross section of a cerebrum shows Descartes' view of what may now be called a "brain central," where the cerebral currents can be redirected to outlying bodily parts through machine-switching operations of great precision.

The energy supply is automatic (although not exempt from "modulation" by phases of consciousness) while entering through the so-called Kernel H. This emits nerve currents through many pores — as a, b, c — reaching opened-up neuro-ducts individually — as 2, 4, 6 — or percolating to larger combinations set up among the ducts. The resultant pattern formation leaves traces as distinctive as any stencil that could be punched by hand. While appropriate signals reopen these formations, they are originally stamped in (unless present at birth) by impulses signaled from outlying sensory keyboards — here typified by the eye, with its retina and optic fibers. See p. 116

In the Fourth Century B.C., with virtually no background of science, Aristotle, tackling the personality problem, was as puzzled as would be a Hottentot today finding a radio receiver in full blast behind a *kopje*. The Hottentot, driven by the natural instigations of curiosity and manipulation, would recognize the knurled knob of the dialing mechanism as inviting a twirl by thumb and index finger. Improving on instinct, he would soon establish a linkage of memory amounting to a calibration between dial positions and recognizable radio-station programs. But he would not visualize the medium of transmission or the substrate in radio waves and varied "frequencies" of the ether lanes or field of force. Similarly, Aristotle could form no idea of nerve paths, neuro-electric waves, or brain lanes, for nobody could tell a nerve from a tendon — white threads all.

Yet Aristotle did calibrate the relation of thought to things and of thoughts to each other. And how? By inventing logic, a system for drawing correct conclusions from *accepted* facts, which has required only minor modifications in 23 centuries. Not only did he show how fallacies occur amid the cogs and wheels of reasoning, but explained errors of the senses: "Aristotle's illusion" (see p. 97) remains the pilot illustration of how thought is misled anent the external world when depending too exclusively on habitual responses that have linked a sensory neuro-signal with some mental image. To be sure, Aristotle's physiology suffered by his too great attention to obvious contrasts like bodily heat and cold and the accompanying expansion and contraction of various bodily parts, shown in blushing and in the now tight, now loose, fit of a finger ring. These effects (now familiar in the "lie detector") are alterations in the caliber of the small arteries, just noticeable enough to have masked from the ancients the steady

process of circulation. Hence, Aristotle taught that the life fluid sloshed back and forth from the heart.

Thus it was left for Harvey in 1628, after ages in which anatomy was banned by obscurantist authority, to disclose that the blood moves through pipe lines continuously in circuits that begin and end at the heart, which is a force pump. In fine, the circulation of the blood is just a hydraulic system, so that it is possible for Lindbergh and Carrel to substitute a glassware "perfusion pump" for heart action in keeping extirpated organs alive in the laboratory.

The knowledge of another kind of circulation of importance to psychology — that of nerve impulses through the brain — is obscured by the historical lag already referred to. As brain traffic, on the model of the automatic telephone exchange, it is being taught only in a few faculties of mental science, but elsewhere this teaching encounters the hugger-mugger sentiments it has been struggling against for three centuries. It is of interest, therefore, to review the matter historically.

How Mechanical Comparisons Clarified Physiology

The opposition to Harvey's discovery, to be expected from the prejudice against mechanism, was softened by a happy coincidence with the fashions of the times. For the rise of luxury and ornament had led to a fad for pipe lines, not only to supply fountains, like those admired at Versailles, but for fanciful contrivances, such as mechanical statues animated by water pressure. In the royal gardens were grottoes, enclosing pools, where the unsuspecting visitors would tread upon tiles concealing hydraulic trigger valves, which determined the evolutions of nearby statues. "For example, if they approach a Diana in view who is bathing, they will cause her to hide among the reeds; and if they pass further along they will see coming toward them a Neptune who will threaten them with his trident . . . or similar things, according to the caprice of the engineers who have constructed them."⁶

Such piquant devices, executing prearranged shifts, "according to the disposition of the tubes," afforded Descartes examples by which to clarify his explanation of how nerve waves start from a sensory terminal, reach a center, and "reflect back" a visible form of behavior or action pattern. From this exposition is derived the world *reflex* and the concept of reflex action universally accepted by physiologists for the *simpler* types of activity. (See diagrams above and on p. 99.)

This triumph of engineering concepts in the face of the historical lag in philosophy was a prelude to matching on the physical side, or in brain action, the already well-established picture of the train of logical thought that Aristotle had drawn from mere introspection. The theory of reflex action, even confined to simple types of activity, had seemed dangerously materialistic, but Descartes went so far as to work out diagrammatically an explanation of the processing of ideas that even today is tenable. Except for the interference of prejudice born of historic disputes, the two conceptions of *unconscious cerebration* (Descartes) and of *logical mentation* (Aristotle) would have marched together to mop up the mystery of mentality, which (*Continued on page 112*)

Adventures in a Vacuum

Electrons at Work and Play

BY J. WARREN HORTON

A VACUUM is generally understood to be a place where nothing is. We might, therefore, expect it to be a place where nothing happens. On the other hand, a vacuum costs money; hence it would appear to have value. It has. Several of the more startling and important scientific developments of the past 30 years, such as long-distance telephony, radio, television, and the talking pictures, are possible only because of certain phenomena which occur nowhere except in a vacuum.

Early in the Nineteenth Century, it was known that electricity could be conducted through a tube containing gas at a very low pressure. The knowledge was of only mild academic interest, however, for a long period. The first decisive step in the direction of our present vacuum tube was taken by none other than that genius of experimentation, Thomas A. Edison, in one of the most beautifully simple experiments of all time. Apparently for the sole purpose of seeing what, if anything, would happen—a motive, by the way, which carried him to magnificent results which more learned men would have missed—Edison sealed a metal plate into one of the embryonic electric lamps with which he was playing. He then connected a battery between this plate and the glowing filament, and, lo, an electric current passed across the space between them. This was in 1883.

The experiment was repeated by others, all of whom succeeded in getting a current of electricity between the plate and the filament, provided the filament was at a sufficient temperature, the battery of sufficient voltage, and the current indicator of sufficient sensitivity. Having recovered from the first amazement at this strange phenomenon, other scientists, notably J. A. Fleming, in England, investigated the laws governing the flow of this current. It became at once evident that this mysteriously conducted current behaved quite differently from those currents conducted more conventionally in copper wires. In an ordinary conductor the current can, of course, flow equally well in either direction. For a given voltage in the battery connected to the wire, the resulting current will have a definite value; if the voltage is doubled, the current will likewise be doubled; if the voltage is increased threefold, the current will increase threefold. In the path across the vacuum, however, the current can flow in one direction only; if the battery is connected in one way, there will be no current at all; if it is connected in the opposite way, there will be current of a certain definite magnitude. Furthermore, if the voltage of the battery is now doubled, the current will increase fourfold; if the voltage is increased fourfold,

the current will increase to 16 times its initial value, and so on. Here, then, was a new type of electrical conductor, and one bold enough to disregard the basic traffic rule of electrical science. Was there any use to be made of it?

Fortunately the detection of radio signals, the possibilities of which were just beginning to be admitted, required a conductor having properties of this nature. The Edison tube was consequently put to work in radio in competition with the old familiar cat-whisker and other devices of a similar temperamental nature. In this work it was unable to distinguish itself—except perhaps in this matter of temperament—inasmuch as its cost and the necessity for batteries for heating the filament were

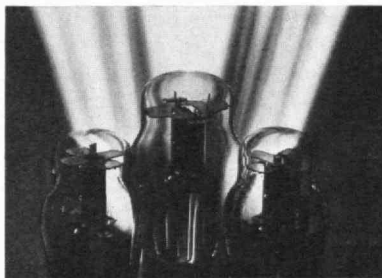
not offset by any decided operating advantages. Like the other existing types of detectors, it succeeded in delivering to the head phones only a small fraction of the microscopic amount of power collected by the antenna. This first toddling step required 13 years and it brings our story up to 1896.

Early in the attempts to utilize the Edison tube as a radio detector, it was realized that its sensitivity might

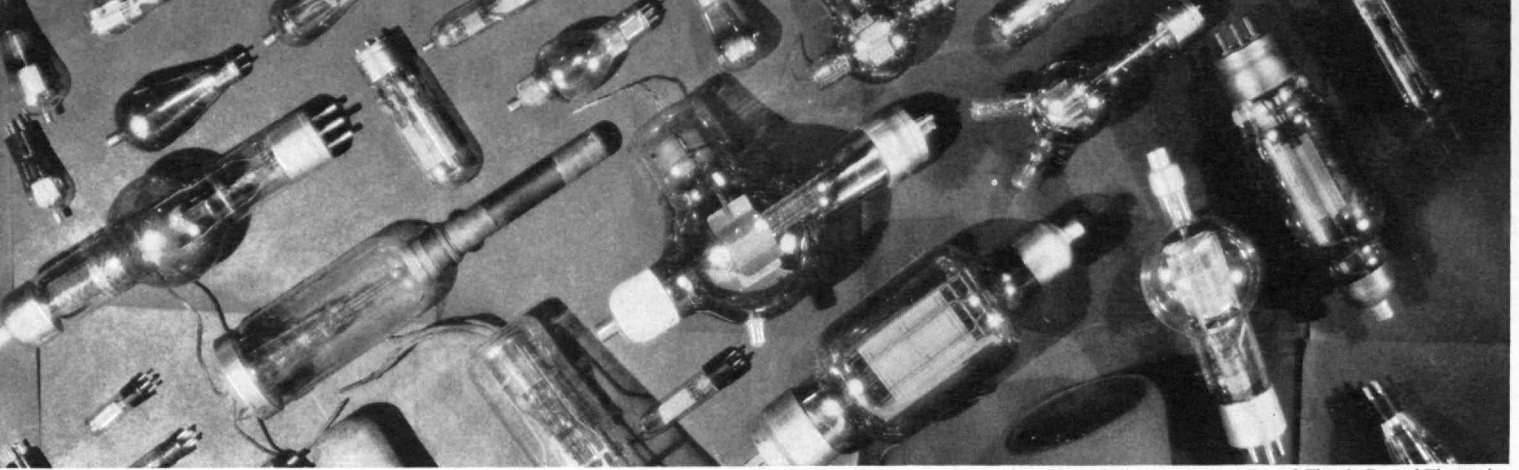
be materially increased by taking advantage of the unorthodox relation between the voltage impressed on the tube and the resulting current. As we have seen, an increase in the voltage from four units to five units causes the current to increase from 16 to 25 units. In other words, a change of one unit of voltage, between four and five, is nine times as effective in producing a change in current as a single unit alone would be. In going from 10 units of voltage to 11 units, the change in current would be even greater; namely, that corresponding to the difference between 100 and 121. It became common practice, therefore, to supply, between the filament and the plate of the vacuum tube, a considerable voltage from a battery in addition to the voltage obtained from the detector. This made the vacuum tube much more effective as a detector of radio signals, inasmuch as it became possible to deliver to the head phones more energy than was collected by the antenna.

Among those who had been most active in exploring the possibilities of the vacuum tube was a young radio engineer, Lee de Forest. In 1907 de Forest tried an experiment. He added a third electrode between the hot filament and Edison's plate. The antenna voltage was applied to this new electrode, the supplementary voltage being left connected to the original plate.

The full significance of this history-making experiment was not at once realized. It soon became apparent, however, that a voltage applied to this third electrode, or grid, was many times more effective in changing the



Margaret Bourke-White



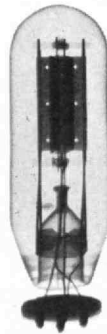
Vacuum tube photographs on this and opposite page courtesy of General Electric Co. and Electronics

current between the plate and filament than the same voltage applied to the plate itself would have been. In fact, it was discovered that a small amount of power applied to this grid would control a considerably greater amount of power from the plate. This power from the plate is obtained from the battery supplying the supplementary voltage and not from the antenna at all. Finally, it became evident that with this new three-element tube it was possible to supply to the head phones many times more power than the antenna could collect from the ether.

Let us see what this meant to the young art of radio transmission. In order to increase the sound delivered by a radio receiver, without the use of vacuum tubes, it would have been necessary to increase the power emitted by the sending station. Assuming that means for controlling this increased power were available, which certainly was not the case, this procedure would have received the veto which no congress can override, that veto sealed with the well-remembered dollar sign. Of the power put into the ether by the transmitter, only an infinitesimal portion ever reaches the receiving antenna. The remainder wanders off into interstellar space and literally echoes among the spheres. To increase the received power by increasing the transmitted power would have increased this lost power in equal proportion; and our foreign debts are already high enough.

With the new vacuum tube, on the other hand, if we want more noise from our radio, we simply buy a few batteries from the hardware store, or abstract a small amount of energy from the nearest electric light outlet. The vacuum tube controls the flow of this cheap electrical energy so that it follows, on a greatly magnified scale, all those subtle changes in intensity which we identify as a Beethoven sonata, or as the "Rhapsody in Blue," or so that the sequence of its values may acquaint us with the salient features of the newest laxative.

By putting the grid into Edison's tube, de Forest gave to discouraged inventors and engineers a new switch for controlling electric currents. This switch has two characteristics which place it in a class to which no other type of switch has ever aspired. Perhaps the most astonishing characteristic is its incredible speed. Even the man who was so fast that he could turn out the light and get into bed before the room was dark could not have kept pace with the vacuum tube. It can turn on an electric wave and then, before that wave, traveling with the speed of light, has gone a quarter of an inch, turn it off again. In other words, between the time when a light is extinguished and the time when the room is dark, the vacuum tube can turn a current on and off a thousand times!



The second important characteristic of the vacuum tube is its ability, even when operating at this terrific speed, to adjust the intensity of the current accurately to the prescribed value. There is, for example, no detail of the variations in tone which are so exclusively characteristic of Lily Pons which the vacuum tube cannot follow with the most complete fidelity. The how and the why of all this is an intensely interesting story. It is, however, another story, and we may safely leave it in the hands of that group of strange men who understand such matters. For our purposes, we may accept the vacuum tube as a gift from the gods and Lee de Forest.

It is not difficult to imagine that a switch — or, as the British would say, a valve — having the amazing powers of the vacuum tube would have a great utility in many electrical problems. There have been many sound inventions which worked perfectly, on paper, until the actual magnitudes of the currents involved were estimated. Computations proving that the maximum current to be expected from one part of the proposed system fell far short of that demanded by some other have been responsible for untold misery on the part of countless worthy inventors. Consider the rebirth of hope, as they became aware of the ability of these new switches to supply, under the control of the most feeble currents, sufficient electrical power to make their dreams come true.

One notable feature of the vacuum tube is its arithmetical conduct. If one tube is found to be inadequate for a given purpose, another may be added. Their effects, instead of being added, are multiplied. Actually this violates no existing laws of physical science; if one tube yields a current 20 times greater than that controlling its operation, this larger current, impressed on a second tube, will in turn control a current 20 times larger, or 400 times greater than the original current.

As an illustration of the limits to which this successive multiplication may be carried, there is no more awe-inspiring example than that afforded by long-distance telephony. If we were to examine the performance of a high-grade telephone line, of the type which is strung on glass insulators on poles, we should find that the energy available at the end of a 300-mile length is only 1/10th that supplied to the beginning. An equal loss occurs in the next 300-mile span, so that at one end of a 600-mile length there will be only 1/100th of the energy put in at the other. To cross the continent, 12 of these 300-mile lengths will be required. If we carry our computation to the end, we shall find that the energy available on the Atlantic coast would be one millionth of one millionth of that starting the journey from San Francisco. Does this

number not appear to indicate an insurmountable barrier to transcontinental telephony? Let us add a few vacuum tubes and see what happens. Suppose that every 300 miles we put in enough vacuum tubes to permit us to deliver to one section of line 10 times the power received from the preceding section. This will be just enough to make up for the loss in that section. Spaced across the continent, then, we will have 12 of these relay stations, and whenever the current becomes too feeble to carry its message further, our vacuum tube dispatches a fresh courier which, running with the speed of light, carries on until, in its turn, it is exhausted and is replaced by another.

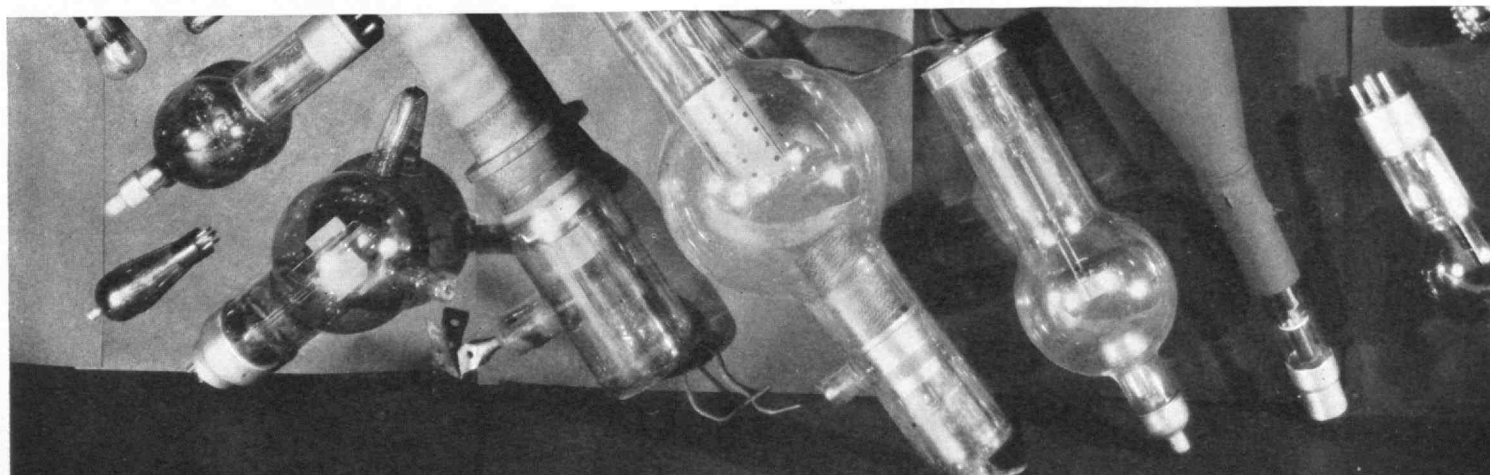
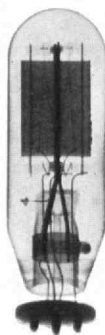
Some young telephone engineer, inspired by the romance of electrical communication, has computed the amount by which the electrical power used by the San Francisco-London circuit exceeds that which would have been delivered had all vacuum tubes been removed from the system. It is a large number. To obtain a comparable figure, we shall have to take the number of times the smallest thing known by man is contained in the largest thing. The most recent estimate for the number of electrons in the universe is a number which may be represented by the digit 1 with 79 ciphers between it and the decimal point. To express the ratio of the power increase due to the vacuum tubes in the San Francisco-London circuit, we shall have to multiply this number by another even more staggering. The actual figure is represented by the digit 1 with 180 ciphers after it. If printed with the type used for this article, it would be 10.5 inches long. If you wish, you may have the use of this system for \$15 a minute.

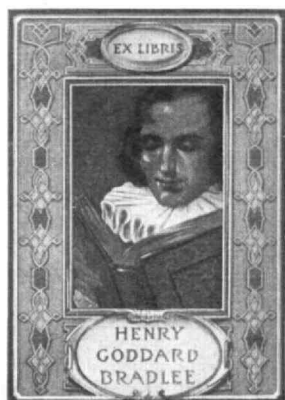
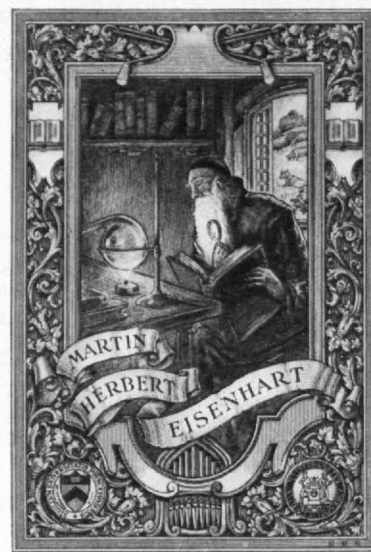
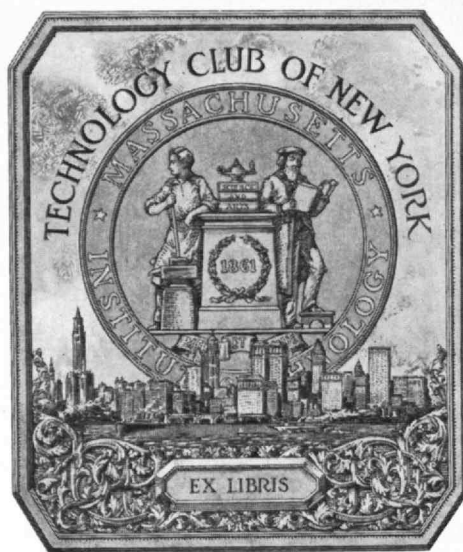
Although the scope of its application would never have become international without the help of the vacuum tube, the telephone is quite able to maintain its place in the community on its own merit. This is not the case with television. Over 50 years ago a detailed method for accomplishing television was proposed. In principle, this proposal was similar to those now in use both for television and for the transmission of single still pictures. These systems have a lens which, unlike the lens in a camera, is focused on only one point of the image at a time. The situation at this point, with respect to the amount of light, or to the tone value, is revealed to a device which controls the intensity of an electric current accordingly. The lens then moves on to the next point. If the tone value of the image has altered, a new value is assigned to the electric current. This process is kept up until the entire image has been surveyed. We thus have an electric current, the intensity of which varies from instant to instant as the scanning mechanism moves from point to point. At the receiving end, a light is so controlled by this current that, at each instant, its

intensity is proportional to the tone value of the point on the original image then under the scrutiny of the scanning lens. Finally, this local light is distributed over some surface in such a way that the points being illuminated and the points being scanned occupy corresponding positions. In this way, the light from the various parts of the illuminated surface is proportional to the light from similarly located parts of the original object and an image of that object is secured.

This relatively simple scheme is sound in respect to every functional detail. It seemed doomed to complete failure, however, because the current which could be controlled by the scanning apparatus was so hopelessly inadequate to control, in its turn, the light to be distributed at the receiving end. Even today, with the most efficient forms of lamps capable of responding with the required speed, and with the most highly developed methods for controlling an electric current by the intensity of a beam of light, the current needed by the lamp is many times greater than that supplied by the scanning system. In the first really workable television system, which was demonstrated by the Bell Telephone Company in 1927, this discrepancy was of the order of one hundred million. This does not take into account the loss of current if transmission over any appreciable distance is attempted. Of the current put on to the line in Washington, only 1/300th succeeded in reaching New York. These numerical gaps are quite within the power of the vacuum tube to bridge.

There are further difficulties to be overcome in achieving television. As we have seen, there are optical systems at the two ends of the line which have to function in close relation to each other. One picks up a light value from a given point on the object being viewed and the other puts down a light value of proportional intensity at a point on the image which must correspond exactly in position. When the lamp at the receiving end flashes up in response to the twinkle of an eye, that flash must be located at the spot where the eye belongs. In television, these two systems have to work at high speed. In the crudest form of apparatus which has been built, they have to deal with some 50,000 individual points per second. The coördination of their action is, as might be expected, effected with the aid of the vacuum tube. A small generator connected to one mechanism develops an alternating current which is transmitted to the other end of the line and there, by means of high-power vacuum tubes, is stepped up to an amplitude where it is capable of driving a motor similar to those used in the now common electric clocks. Thus the two machines march in locked quick-step to the rhythm of a high-pitched hum of low intensity carried by an ordinary telephone line. It (*Continued on page 120*)





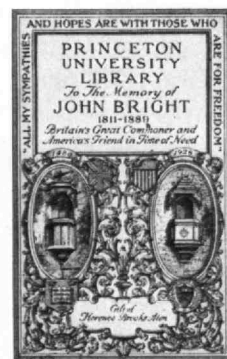
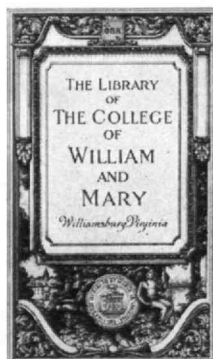
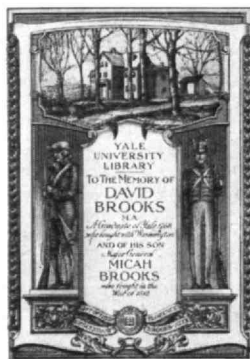
Bookplates by *Elisha Brown Bird, '91*



In an age of mass production and regimentation, when even babies come five at a time, it is a pleasure to call attention to so individualistic an art as bookplate design and to a designer so adept at emphasizing individuality as Elisha Brown Bird, '91 (for biographical details see page 81).

With over 400 bookplates of his from which to choose, it was difficult to limit the examples produced here to a mere ten. The ten, however, are sufficiently varied to show the range of Mr. Bird's inventiveness, the prodigality of his designs, and the possibilities of bookplates as compelling works of art.

The five plates presented above are related to M.I.T.; the remaining five, below, are excellent examples of his many institutional designs. Of the Technology group, three are the property of Alumni: Martin Herbert Eisenhart, '07, Henry Goddard Bradlee, '91, and L. D. Gardner, '98.



THE INSTITUTE GAZETTE

PREPARED IN COLLABORATION WITH THE TECHNOLOGY NEWS SERVICE

Five and Seventy Years

NOW that the time approaches when Technology will attain the philosophic age of five and 70 years, it seems fitting, in anticipation of that anniversary which will be marked April 10 next, the date of incorporation, to review and to reemphasize the aims and the pervading spirit of our institution, continuing the discussion initiated by President Compton in that part of his annual report published in *The Review* last month. The attempt appears all the more worth while in view of the many changes in educational outlook and effort that have caused excitement, not to say confusion, over a great part of the academic world in the course of this well-nigh reborn generation.

Above all, Technology has reason for proper pride in the realization that it was not only an originator in the field of scientific education but also a pioneer in the steady association of cultural studies with the labors of the research laboratory and development of technological technique. At the very start, while the founding of the Institute was as yet but a dream in the mind of William Barton Rogers, that dream took on definite form and figure as of a place where the whole man, and not merely special intellectual and practical powers, was to be trained for the tasks and responsibilities as well as the enjoyment of life. Rogers, himself a man of many gifts and of wide culture, was not the sort of thinker, not the sort of teacher, who would content himself with knowing or imparting purely mechanical or utilitarian skills. For him, the world of nature was not merely an interesting world, challenging to the understanding and the industry of the seeker after knowledge; it was also a beautiful world, rich to overflowing with esthetic charm, a world lovely and sublime with meanings and values. He was poet as well as scholar and technician. To say that the ruling qualities of this remarkable personality became in due time integrated with the institution which he founded is in fewest words to summarize the educational philosophy adopted and since followed by Technology.

General Walker, in his fruitful term, carried forward the tradition which has been continued by his successors till today. New ways have been found of expanding and enriching the goals so set up. The vacillating winds of pedagogic theory that have blown this way and that during this rushing and distracting three quarters of a century have not deflected the minds of those responsible for the progress of the Institute; for they have been men—themselves examples of a humane culture—who treasured the fruits of discipline in the humanities.

This year, too, marks the entrance of a second group into the new five-year course, which the first group entered last year. This course was established, as told at the time, to educate scientists and engineers for greater public service. It was the Institute's response,

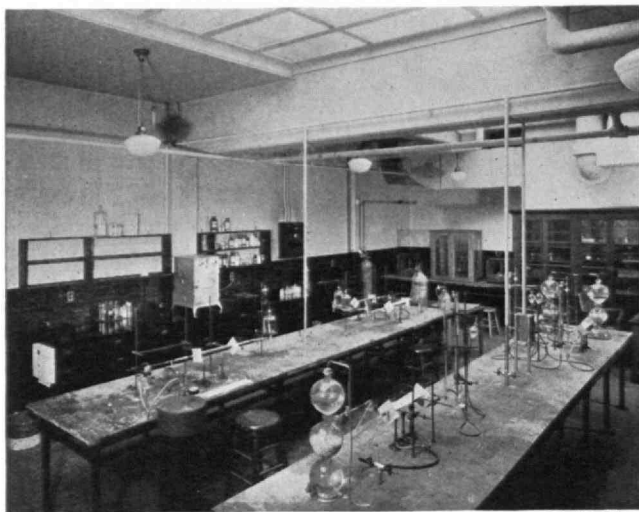
as President Compton has said, "to a growing need for engineers and scientists who have a firm grasp of the social implications of their work; who understand how technology is related to business life and to that vaster complex of activities which we call the economic and social process."

President Compton, writing lately in the *New York Times*, has drawn attention anew to this course as a further unfolding of the work in the humanities that has always been stressed here. After tracing the earlier course of events in this domain and pointing out that a faculty committee, in cooperation with department heads, is now making a thorough study of ways in which the courses in the humanities may be improved in content or organization, Dr. Compton said of the five-year course: "Three considerations were put forward as pointing to the importance and timeliness of this new adventure in technological education. The first of these is the certainty that applied science will play an ever-increasing rôle in determining our economic and social life. The second is the increasing emphasis on organized cooperation, with economic and social controls, which creates an urgent demand for men with an engineering training and a broad conception of relative social values and economic processes. The third of these considerations is the desirability of developing a cooperative approach to economic problems by the engineer and the economist, similar to the fruitful cooperation of the engineer with the physicist and the mathematician."

Then, in more general terms, the President went on to touch upon the philosophic reasons which justify and even demand that artificial boundaries between the many fields of interrelated culture be now set aside, that the several disciplines of the traditional schools be considered as comprising an organic whole: "The swift and deep-going changes of recent years have brought us all face to face with the fact that, as Professor George Sarton, historian of science, has said: 'Our division of sciences into many branches is largely artificial; we must consider them as if they were the branches of a living tree, which have no separate existence, but grow all together.'"

"The story of science and the story of religion are but phases of the quest of the spirit. The theory of music was for centuries taught as a branch of mathematics. 'The discovery of the logical structure of language was as much a scientific discovery as, for example, the anatomical structure of the body.' 'The bounds of all departments of human research and speculation,' writes J. H. Robinson in his 'New History,' 'are inherently provisional, indefinite, and fluctuating,' while William McDougall in 'The Frontiers of Psychology,' reaches the same conclusion by a different approach.

"Some of the ancients believed that behind all phenomena lay a single reality. Today, as we follow the interrelationships of modern physics, leading up to



M.I.T. Photo

NEW LABORATORY FOR QUANTITATIVE ORGANIC ANALYSIS

In order to permit a more complete and rounded development of the teaching of micro- and semi-micro-methods for the quantitative determination of the constituent elements and radicals in organic chemical compounds, the combustion room on the fourth floor of Building 4, which had served the Department of Chemistry for 20 years, was remodeled during the past summer. Following the pioneer researches of Fritz Pregl in Austria on micro-methods of analysis, work of this kind was started at Technology in 1927, and it has grown gradually, until now a new required subject has been introduced into the curriculum, supplanting completely instruction in the century-old macro-methods of Liebig and Dumas.

Micro-methods are very economical of time and materials. For example, in ultimate analysis by macro-method, samples of 200 to 300 milligrams are required, whereas quantities of but 1/20 to 1/40 of these amounts are sufficient for the newer procedures. This is a great advantage in the course of researches where, often, half a gram or less may be the total initial yield of a new product.

No small part of the success of very delicate methods of analysis depends on scrupulously clean working conditions and fairly even temperatures. To attain these ends, a steel and glass ceiling was constructed under the existing skylight, thus effectively preventing sand and soot sifting in from the roof and avoiding rapid temperature fluctuations. The inside surface of that part of the skylight nearest the balances has been given a single coat of aluminum paint to reflect much of the sun's heat without greatly diminishing its light. Relocation of work tables and a new arrangement of outlets for gas and electricity permit flexibility in placing apparatus, thus ensuring a long lease of usefulness for the remodeled room.

that of mass and energy which are convertible one into the other, something of the same thought is suggested. Truth, as attained by the human spirit, appears to be one, though it alters with the receptacle into which it happens to be poured. In the test tube of the laboratory it may be a deadly or a healing germ, or a poison gas; at the feast, it sparkles in the wine of conviviality; in the ritual of worship, it glows in the chalice that symbolizes everlasting life. We may draw nearer to truth by way of science or by way of poetry, but we shall come safest and surest if we approach by every path."

Cosmic Variations

VARIATIONS in cosmic-ray intensity, a subject of wide scientific interest, will be studied at the Institute this winter with one of the seven new cosmic-

ray intensity meters which are to be used in a world-wide investigation of cosmic radiation under the auspices of the Carnegie Institution of Washington.

These new instruments, each of which weighs more than a ton, were built at the University of Chicago under the direction of Dr. Arthur H. Compton, who, with Dr. A. W. Simon, also of the University of Chicago, and Professor Ralph D. Bennett of the Department of Electrical Engineering at Technology, designed them.

The purpose of these extremely sensitive meters is to measure the variations from normal in cosmic-ray intensity and to discover, if possible, the source of the rays by correlation of these variations with such manifestations as sidereal time, sun-spot cycles, terrestrial and solar magnetic storms, and the rotation of the galaxy. The meters will also be used to study the nature and origin of the terrific bursts of energy released in the form of thousands of cosmic-ray particles traveling downward together at enormous velocities, the total energy in each burst surpassing by thousands of times that of any other known atomic cataclysm.

In designing these instruments, the problem was to produce a mechanical observer which would make continuous records of the behavior of cosmic rays day and night for long periods without attention. Each of the new meters employs a small motor to drive a moving strip of photographic film in a camera which records the measurements over a period of months.

Measurements of cosmic-ray intensity are made possible in this instrument by their effect on very pure argon gas which is confined in a 14-inch steel bomb at a pressure of 750 pounds to the square inch. To avoid interference from other forms of radiation, such as those from radioactive materials in the earth and air, the argon gas bomb is buried in the center of a large steel sphere containing 2,500 pounds of lead shot, which act as a shield against undesirable radiation, but are easily penetrated by the powerful cosmic rays.

The cosmic-ray meter at Technology is already in operation in a laboratory in the Department of Electrical Engineering under the supervision of Professor Bennett. After tests under various conditions during the winter, the instrument will be taken next summer to the storm-swept peak of Mount Evans, Colo., where, at an elevation of 14,265 feet above sea level, it will begin operation as one of the instruments in the world-wide chain of stations. It was to the top of Mount Evans that Professor Bennett, Gordon S. Brown, '31, and Henry A. Rahmel, '33, of Technology's Department of Electrical Engineering, took the first model of the meter for tests last year. For several weeks in the face of snowy gales, violent electrical storms, and freezing temperatures, they carried on investigations that aided in the final design of the meters.

One meter is now in operation at the Carnegie Institution's field station at Cheltenham in Maryland. Another is on its way to Peru, where it will be installed at the institution's magnetic observatory at Huancayo. Another is expected to go to the interior of the Mexican highlands, and one will be taken to the Danish observatory in the northern Greenland ice fields. Still another will be stationed in New Zealand, and the seventh at the University of Chicago.

Working Into It

UPON completing his formal education, the student is abruptly swept from the careful supervision of the classroom and laboratory to face the problems of life in his profession. The gap between college and the professional world is wide, and it takes a long stride to cover it. In addition to a good technical foundation, it is necessary for the student to have the broadest view possible of his field of work and a fundamental understanding of human relationships. To this purpose, the Department of Mechanical Engineering has instituted a program of student counsel in its second-year course.

The basic aims of the project are the development of a more cordial and effective relationship between the departmental staff and students; a clearly defined picture of mechanical engineering and its many branches; and the encouragement of appreciation of the fact that an engineering education is not properly composed of the gathering of technical information alone, but should consider the development of a personality which can be assimilated into a working organization upon graduation.

The latter aim is justified by the attitude of prospective employers of graduates who are as much concerned with the personality of the candidate as with his scholastic achievement.

The program includes assignment of the sophomores to staff advisers; a series of orientation-in-mechanical-engineering meetings; portrayal of the industrial conditions under which the engineer will work by practicing engineers and by visits to industrial plants; social contact with the departmental staff away from the classroom.

Two meetings of the sophomores have been held under the leadership of Mr. Sloane of the departmental staff during which the program has been discussed and the initial stages of the orientation program have been developed.

Fighting Friction

THE MECHANICS of lubrication, subject of an important series of lectures by Mayo D. Hersey, '09, now being given in the Institute's Department of Mechanical Engineering, is a matter of universal importance, for all industrial power converted into heat by friction is finally converted into an item of cost on the debit side of the ledger. One of the chief objectives of lubrication research is to reduce such losses. Others are to lengthen the life of bearing surfaces, reduce loss of time for repairs, and to economize space by reducing the area of bearing surfaces. Although surprising results have already been attained, much remains to be learned about the mechanics of lubrication. This important subject will be treated at greater length in a subsequent issue of *The Review*.

Council Meeting No. 182

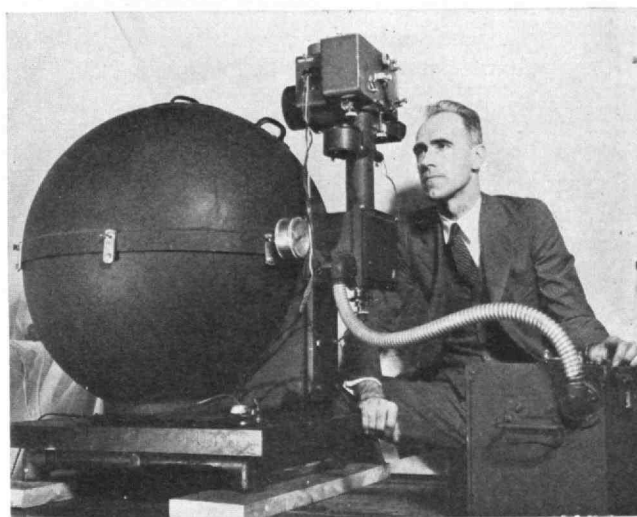
WHEN Secretary Charles E. Locke, '96, counted noses at the opening meeting of the Alumni Council on October 28, he arrived, with fair precision it is safe to assume, at a total of 101. He was not indulging in

hyperbole, therefore, when he jubilantly exclaimed in his minutes of the meeting that "President Moreland, '07, may well be proud of the excellent start of his season of meetings which is carrying on the splendid record set by President Charles E. Smith, '00, last year. The activity and enthusiasm shown at this first meeting may very likely mean the setting of a still higher record this year over the already high record of last year." It is a pleasure to report here this accolade to our new alumni President.

Preceding a talk by Professor R. D. Fay, '17, on yacht racing in England, based on his article in the last issue of *The Review* (p. 55), the Council had a crowded business session. Of the various items discussed, Alumni at large will be interested in the following:

Report of the Committee on Constitution and By-Laws. Three years ago the alumni electorate tentatively approved a new constitution for the Association for three years, making the provision that at the end of this period the success of the new document be studied by a committee of the Council and definite recommendation be made as to whether the new constitution should be permanently adopted or reversion made to the old constitution. This committee's report, amended by the Executive Committee of the Council, recommended that no change be made at the present time; that the trial period for the new constitution be extended two more years, to March, 1938; and that unless the Alumni Council or at least five local clubs shall file with the Alumni Secretary formal written notice of their objections, the new constitution be recognized as permanently adopted at the end of that period.

The Report of the Committee on Audit and Budget. "The auditors report that they found no discrepancies and that the accounts are all in good order. Their report is available to any member of the Alumni Council who cares to examine it, and it may be seen in the office of the Association Treasurer, J. R. Killian, Jr., '26. It is believed that any member of the Council who is



M.I.T. Photo

One of the seven new cosmic-ray intensity meters which will be used in a world-wide survey of cosmic radiation. Professor Ralph D. Bennett of the Department of Electrical Engineering is shown with the meter installed at Technology. See page 106



Autumn Silhouettes, President's Garden, M.I.T.

interested in the detailed financial workings of the Association would find a careful study of this report most interesting. The Committee has examined the proposed budget for the year 1935-1936 as submitted by the Treasurer, has approved it, and transmitted it to the Executive Committee of the Council for formal action."

Report of the Treasurer. The Alumni Association fiscal year 1934-1935 ended with a net operating surplus of approximately \$1,000. The deficit for the current year, as of October 1, was \$442, which compares with the deficit last year of \$739, a decrease in loss derived primarily from an increase in dues payments (dues payments have increased this year by approximately 10%).

Visits to Local Clubs. Dean H. E. Lobdell, '17, was in St. Louis, October 14, Kansas City, October 15, Chicago, October 17, Minneapolis-St. Paul, October 21, with a group in Great Falls, Mont., on October 23, in Butte, October 24, Salt Lake City, October 26, and Denver, October 28. Carl W. Gram, '09, has presumably been making some contacts with European groups while he is on that continent, and, likewise, Professor C. E. Turner, '17, has it in mind to make contacts with a number of local clubs on his trip around the world. Dr. Norbert Wiener visited San Francisco on July 9,

Honolulu, July 17, Tokyo, about July 27, and Osaka, August 2. He is contemplating visiting other clubs in China and elsewhere on his trip around the world after he finishes his year of teaching in Peiping. President Karl T. Compton and C. E. Locke, '96, were in Worcester, June 12. Professor D. C. Jackson, who departed with Mrs. Jackson on their trip around the world, visited Schenectady on September 19, Chicago, September 25, San Francisco, October 1, Honolulu, October 8, and other meetings are planned for him as he continues on through the Philippines, China, and Japan. Professor A. C. Hardy, '18, was in Baltimore on October 27. Professor S. C. Prescott, '94, attended a breakfast of the Technology men who were attending the public health convention in Milwaukee on October 8. The large number of these visits indicates the widespread activity of the Technology clubs throughout the world and the energy and alertness of the Secretary in obtaining for these clubs speakers from the Institute staff.

Forthcoming Council Meetings. The meeting of February 24, 1936, will be the annual combined meeting with the Faculty Club and the two speakers will be Dr. Fuess and Dr. Perry of Andover and Exeter Academies, respectively, who will present their viewpoints on the relations of Technology with preparatory schools. It

is planned to invite as guests on that occasion the heads of private preparatory schools in the vicinity of Boston.

At Round Hill

MEMBERS of the Corporation, the Research Associates, distinguished scientists and engineers, as well as representatives of the Army and Navy, the Department of Commerce, the presidents of leading air transport lines and members of the Faculty who have been associated with the work, were guests of Technology and of Colonel E. H. R. Green at the Institute's field research station at Round Hill, Colonel Green's estate at South Dartmouth, on November 23.

The program, which began early in the afternoon, included an explanation of the objectives of the program of research on fog and its dissipation, which was followed by a demonstration of the experimental apparatus for dissipating fog on Colonel Green's Round Hill airport. Following an introductory description by Dr. Compton of the high voltage nuclear research program, Dr. Van de Graaff and his associates gave a number of spectacular demonstrations, including the production of high voltage sparks and corona on the huge generator.

Corporation Visiting Committee Reports

BELOW are condensations of two more Visiting Committee Reports recently presented to the Corporation of the Institute and published here as part of a series now appearing in *The Review*.

REPORT OF THE VISITING COMMITTEE OF THE DEPARTMENT OF ELECTRICAL ENGINEERING*

PROFESSOR DUGALD C. JACKSON, then retiring Head of the Department after 28 years' service, reviewed the policies which have been developed as the present program of the Department's activities covering such items as the pedagogical processes utilized; the relation of research to the work of the undergraduates above the sophomore year; research by the staff; the development of graduate work; the problems of both undergraduate and graduate subjects of instruction; coöperation between the Electrical Engineering Department and other departments to the Institute; coöperation with industry in education and research; selective treatment of the undergraduate students as individuals, thus giving them a setting similar to graduate students as far as their maturity warrants; the problems of developing the individual qualities of all students; the more pragmatic applications of economics in electrical engineering; and exchange professors.

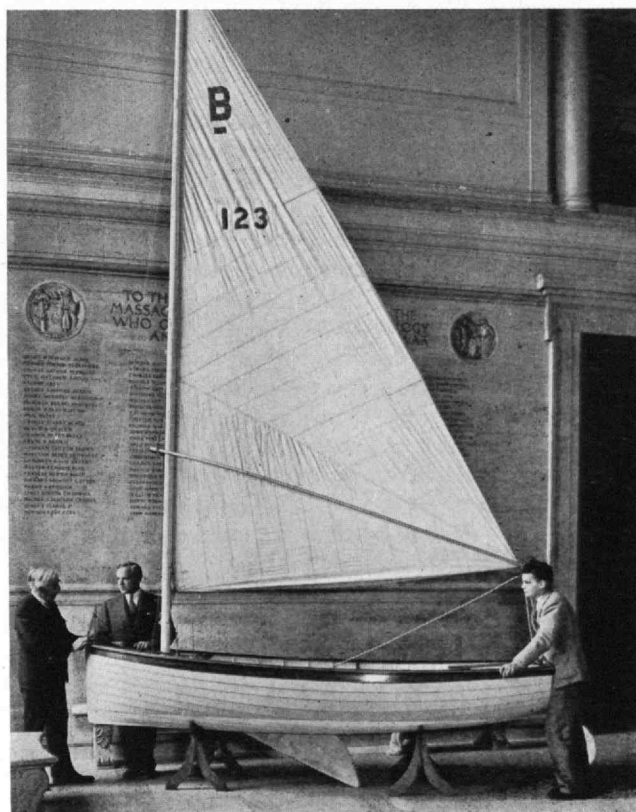
This is the largest department of the Institute in the number of students and also in the number of graduate students. It has a large and distinguished staff, there being a total of 23 men on the staff of faculty rank, 15 instructors and assistants, seven research associates and research assistants, and four nonresident instructors. The latter are associated with the study of the students in the Coöperative Course when they are in their terms at the works, usually in Boston, Lynn, Schenectady, or New York City.

The items on last year's agenda and conclusions presented in last year's committee report were also reviewed by the Committee. The subjects thus considered were: (1) the question of enrollment and space allotted to the Department; (2) the effect of a policy of limiting student numbers; (3) coöperation with the Department of English and History; (4) coöperation with the science departments of the Institute; (5) proposal for improving the social aspects of engineering education and of the engineering profession.

In respect to the first two of these subjects, it was pointed out by President Compton and Dean Bush that the question of stabilization of enrollment is now being given serious study by a special faculty committee which is at work on the problem. The yearly variations in numbers of students coming to the various departments sometimes cause embarrassment. Although space can be reassigned relatively easily, there is no such flexibility with respect to the staff. It would be of service, therefore, if some stabilization could be effected, subject to periodic review and readjustment, in order to meet changing demands in the industries and applications

for admission to the Institute by competent students. The Committee assumes that such stabilization of flexible type can be accomplished without conflict with its recommendation stated in last year's report that "it appears to be wisdom to maintain in this country one or more institutions of the highest order in which formal limitations of number are not imposed, provided a high order of scholarship is insisted upon." With respect to electrical engineering, it was pointed out that a full proportion of the high-ranking students of the Institute are pursuing the Department's work and that the Department draws some of the best graduates from other institutions to its graduate work. A rather remarkable proportion of recipients of national fellowships of one kind or another which are available in electrical engineering have come to the Institute to study.

The Committee again commended the friendly coöperation between the Department of Electrical Engineering and the Department of English and History, and between the Department of Electrical Engineering and the various science departments. This coöperation has progressed in a manner which the Committee views with favor and hopes may be maintained. The Committee further approved the recently created, joint, inter-departmental committees which have been appointed



M.I.T. Photo

The Institute Committee, student governing body at Technology, has approved plans for making small-boat sailing a student activity. Enthusiasm for the project has already resulted in bringing a typical Frostbite dinghy to the main lobby of the Institute last month, where it was on exhibition. President Compton, who has given his approval to plans, is shown here inspecting the dinghy. (Left to right) Professor George Owen, '94, of the Department of Naval Architecture, who has offered to give a course in sailing for students wishing to participate in the proposed activity; Dr. Compton; and John C. Austin of Spokane, Wash., President of the Senior Class and of the Institute Committee

* The Committee which made the above report consisted of: Frank B. Jewett, '03, Henry A. Wise Wood, Thomas Spooner, '09, Charles Neave, '90, W. Cameron Forbes, J. Allen Johnson, Don L. Galusha, '04, and Alfred L. Loomis, Chairman.

by President Compton from the Institute Faculty to deal with some of the questions which relate to teaching and research in overlapping fields or in fields in which several departments are interested.

The plan heretofore presented and approved by the Committee for coöperation between the Department of Electrical Engineering and the Department of Economics and Social Science for the purpose of improving the electrical engineering relations with economics was again discussed and approved. Members undertook to give further aid in its development and the effort to secure funds.

The Committee expressed interest in and approval of the plan for exchange professorships which was set up by the Institute and in which the Electrical Engineering Department is participating. In this, the Department is allowed to make an exchange of one professor each year with the electrical engineering department of some other institution, so that younger men of faculty rank may secure a full year of experience in a department in another educational setting, while the post at the Institute is filled by a corresponding professor of electrical engineering from that institution. The exchange this year [1934-1935] is made with the Ohio State University, where the Electrical Engineering Department holds a distinguished place. Assistant Professor Harold L. Hazen, '24, is the M.I.T. Professor at Ohio State University and Assistant Professor John F. Byrne of that university is located at the Institute. The exchange has proved successful from the standpoint of the Institute and apparently is proving equally successful from the standpoint of Ohio State University. An exchange for next year [1935-1936] is arranged with the University of Kansas, for Assistant Professor Richard H. Frazier, '23, to go to them and their Professor Robert W. Warner to come to the Institute. Requests for the exchange for the academic year 1936-1937 have already come in from several institutions of satisfactory standing. As there are nine men of assistant professor's rank in the staff of the Electrical Engineering Department, it is obvious that the exchange can be made readily in successive years from this Department and smaller institutions can participate in the advantages of the exchange from time to time without undue burden on their staffs. The advantages which derive to the Institute lie in greater knowledge of the educational efforts in electrical engineering education throughout the country, which is brought to our staff on account of the intimacy of the exchange relation. It is expected that the knowledge of the best processes of education in electrical engineering will thus always be before the minds of the Institute staff. This can be maintained by the process here described more satisfactorily than by brief visits to the various other engineering schools by our staff, or by other such processes. It has also become characteristic of the Department to have one or two professors from other institutions teach electrical engineering subjects in the Summer Sessions of the Institute, and likewise certain of our younger men are employed for teaching in the summer sessions of other institutions.

These interesting policies are approved by the Committee as another means for vitalizing the views of the younger men and enlarging their enthusiasm for their

work, particularly since they are associated with further arrangements for summer employment in industry by younger members of the staff.

The Committee received with interest the statement that increasing attention is being given by the department staff, coöperating with the Personnel Department, to developing the individual personal qualities of its students. It also heard with interest a statement that the department staff is now reorganizing its undergraduate text material, to bring into the material which is placed in the hands of students in classroom and laboratory the latest aspects of physics and mathematics that are applicable in electrical engineering, associated with improved modes of exposition of complex subjects which have been the result of the past ten years of experience in the progress of teaching in the Department.

REPORT OF THE VISITING COMMITTEE OF THE DEPARTMENT OF MATHEMATICS*

The Committee members had, prior to the meeting, received a statement of the activities of the Department from its Head, Professor Henry B. Phillips, and the ensuing discussion may be summarized as follows:

1. *Admissions.* The entrance requirements of the Institute are being made, over a period of years, considerably more difficult, as in a number of other institutions. The principal question discussed was the probable advantage of more emphasis on algebra in this preliminary training program. Reference was made to the necessity of a maximum of proficiency in algebra in order to carry on the undergraduate program, no matter what course may be followed.

2. *General Undergraduate Programs.* An exhaustive discussion of the regular undergraduate mathematical courses led to no specific suggestions, the opinion of the specialists on the Committee being that we had a very satisfactory situation.

3. *Special Courses.* These were described in some detail but no suggestions were made with respect to them.

4. *Mathematical Laboratory.* This program is looked upon as offering very useful technique for the application of mathematical knowledge. The specific suggestion was made that provisions should be considered for more satisfactory care of the instruments on hand, particularly the Henrici harmonic analyzer which, it is the belief of this Committee, should be permanently mounted. This, if carried out with photo-electric control, would amount to approximately \$400 and the Committee feels such mounting is advisable. The recommendation is also made that, when funds are available, this laboratory be further equipped with the following: Coradi mechanical integrator with attachment for differentiating, and precision pantograph.

5. *Course XVIII* impressed the various members of the Committee with being a very advanced program. The suggestion which came from the detailed discussion was the possible advisability of some subjects in applied mathematics as substitutes or electives in place of some

* The Committee which made the above report consisted of: Henry E. Worcester, '97, Willis F. Harrington, '05, Francis J. Chesterman, '05, Ralph D. Booth, '20, George A. Campbell, '91, R. G. D. Richardson, L. P. Eisenhart, and M. Herbert Eisenhart, '07, Chairman.

of the more highly theoretical courses appearing in the third and fourth years. This was made to offer greater flexibility for the adaptation of the graduate to his problems.

The suggestion was also made in the interest of more specific application that it might be well to have somewhere available in the curriculum a course in mathematical statistics.

6. *Statistics of Teaching.* While there are no specific recommendations made under this heading, some belief was expressed that it would be advisable to reduce classroom groups of students to a maximum of 20, rather than the present customary average of approximately 27. This suggestion was made for consideration by the Department in the interest of the most effective instruction. Considerable discussion took place with respect to the advisability of separating specific classes into two groups, depending upon the ability of the students. This would perhaps mean that about 20% comprising the more alert and rapid students would be segregated from the remaining 80%. The proposal was not offered by the Committee as a specific suggestion but for consideration by the Department.

Regarding the teaching load per instructor, the Committee believed it difficult to determine any specific maximum figure but felt that this problem merited serious consideration.

7. *Research.* The general policy of conducting mathematical research met with the full approval of the Committee.

8 and 9. *Publications.* The conclusion of the Committee was that the *Journal of Mathematics and Physics* should definitely be continued. The general policy of the editorial staff was approved, especially that of publishing papers not only from members of the Institute staff but from a limited number of outside sources.

10. *Library.* As the library is carried on with a very definite program, there seem now to be no funds for completing back files of periodicals. It was suggested by the Committee that the sum of \$4,730 was needed to purchase the desired files of some half-dozen journals.

BENDING MOMENTS

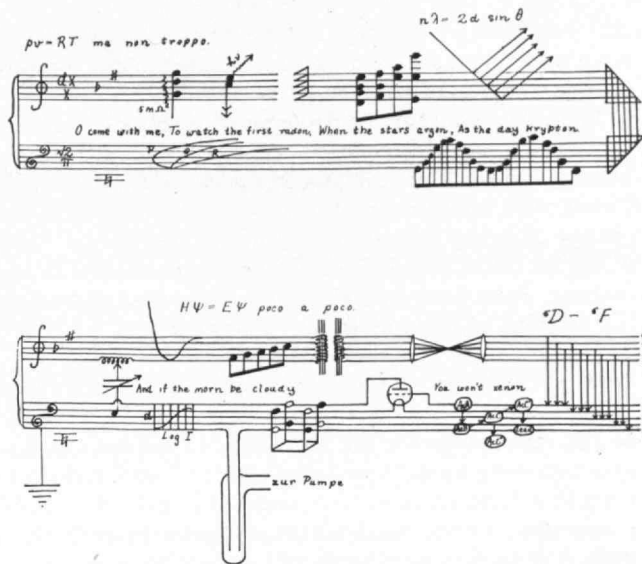
Whoullywaughlies Discovered

SIGMUND FREUD devoted some 347 pages of his "Psychopathology of Everyday Life" to a disquisition on the reasons for humor. La Rochefoucauld has commented that no institution is firmly grounded which cannot laugh at itself. Even we engineers know the value of comic relief.

For the past several years rumors have been current of the founding of an Institute of Useless Research in this country and of the installation of a Chapter at Technology. Since the organization is a secret one, the investigator appointed by The Quidnuncs spent several delightful but fruitless months before locating the headquarters and the grand whoullywaughlies of the Chapter. The investigation was finally successful (sic) and the fruits of the labor in-

PHYSIKALISCHES LIED BY MOLLY KULE

A study on the diatomic scale, arranged for a cyanogen band.



Official song of the M.I.T. Chapter, A.I.U.R. In the parlous of the Eastman Research Laboratories it may be heard frequently above the atomic din, sung a cappella

clude a copy of the Chapter's official song (above) and the following lucid description of the foundation and aims of the organization, written especially for *The Review* and put through a metaphorical mixing machine by the very grandest whoullywaughlies.

THE American Institute of Useless Research, conceived in the gray dawn of scientific thought, brought to fruition through eons of ceaseless toil, now fully hatched, has broken forth from the bud into the raging seas of controversy, from which it rises, plumbing the utmost depths of the ethereal fancies of superstition and speculation, unraveling the serried ranks of unfathomable chaos, thrusting aside expanding horizons of narrow, metaphysical dogma, to the quiet valleys of relentless strife. Viewing from this pinnacle of epistemological erudition the seething and turgid field of scientific endeavor, the A.I.U.R., with calm and myopic vision tacitly heaps contumely, castigation, and vitriolic invective on instigators of utilitarian projects, and crowns with diaphanous accolade those recalcitrant intellects which have courageously recognized the abysmal futility of delving into conventional highways and have blazed a new trail through desert and arid quagmire to the precipitous haven of Useless Research. (*Roma in die deflagrata non est.*) The unlimited boundlessness of the Institute's versatility and catholicity of interest reaches out and embraces the evanescent Arts and Muses. The *Physikalisches Lied*, presented above, forged white-hot in the crystalline maelstrom of implacable genius, by its mellifluous cadence and daring isochronism, spurs its hearers into innocuous desuetude and soothes them with a richness of iconoclastic reverberation. Copies may be had for 75¢, postpaid; prices of phonograph records will be supplied upon request.

THE QUIDNUNCs

EVERYTHING IMPROVED BUT THE MIND

(Continued from page 100)

still beclouds psychology today. The difficulties that have intervened are worth noting as part of the historical lag which is of concern here.

The reflex concept, or doctrine of reactions, was attacked as a sort of *lèse-majesté* against the dignity of the human spirit. (Man robbing the gods of their secret!) Those who entertained it escaped with difficulty the charge of being atheists and radicals. Descartes' view of higher brain processes could not be published in his lifetime. John Locke (1696) shied at the idea of tracing the relation of thought to nerve action.⁷

False Mechanical Comparisons Caused Confusion

The Eighteenth Century men of science took kindly to the fascination for the automata or mechanical figures imitating man. "Condillac's statue" was, however, used to defend an impossible concept of man as merely a sensation-guided machine, as if emotional and intellectual responses were primarily shaped by experience. Although Swedenborg "located" intellect in the brain cortex, the study of actual brain mechanisms progressed slowly during the Eighteenth Century.

Political conditions arose which so exaggerated the concept of liberty or sovereign rights of man that no unprejudiced and merely technical examination of the mechanism of human personality could advance very far. Exploring emotion and intellect, as mechanisms beyond simple reflex action, was an interest swamped by great waves of social and industrial readjustment. Yet two currents of prejudice swirled around the mystery of Created Man and the marvels of artificial manlike machines. Radicals wanted Man to be clearly mechanical; others wanted the mystical element to be retained. The Twentieth Century exhibits a similar contrast between two physiologists: Jacques Loeb viewed man as "deterministically" controlled, like the phototropic moth that has to fly to the flame, while Alexis Carrel⁸ pronounces for "mysticity" in a manner to revive belief in telepathy and the occult — and refresh the aura of mystery around living matter.

Literature has long exploited the sense of wonder about man, without adding any clarification.

In 1816 Mrs. Shelley wrote a mawkish and gruesome story about "Frankenstein or the Modern Prometheus," which scarcely rises above the requirements of the cinema for an appeal to the 13-year-old mind. Hers was the theme of the Forgotten Man — developed from Rousseau's theory of the perfection of Man's original nature and its fateful degradation by the institutions of society, a view emphasized in the young author's mind by the labor troubles in England after 1760. She wished not only to play up the horror and sacrilege of the Swiss engineer's building of a living man, but also to show to what depths of depravity a being with no naturally bad propensities might sink, when under a false position — that is, neglected and despised, as were the mechanized workers in the growing slums.

The uneasy sentiments attaching to the artificial man were not lessened by the treatment of this theme

in the play "R.U.R.," by Karel Capek, which (like "Frankenstein") endowed the language of mankind with a new term. Its success a decade ago was due to a clever titillation of the notions of progress in mechanization, together with the fear of technological unemployment (machines against man) which pervaded the populace even in the inflated Twenties and which culminated emotionally in the propaganda of the Technocrats.

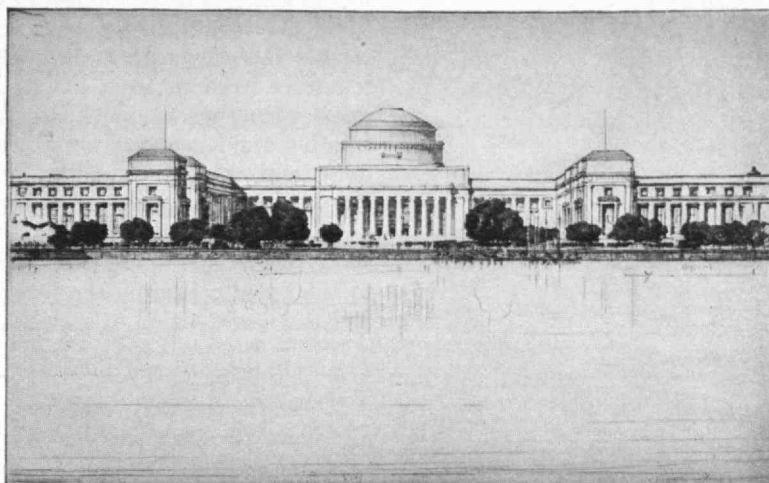
Rossom's Universal Robots, however, present more vividly the psychological and industrial dilemmas involved in the dread concepts of "mechanization" and "rationalization" and act them out more logically than did Mrs. Shelley's monster or his victims. The robots, tireless workers in the mechanized city, are depicted as automata, angular in silhouette and stilted in movement, but "better" than ordinary humans because they thoroughly fulfill the utility concept of mentality by excluding from their routine any spiritual requirements. William McDougall has welcomed this picture as a cartoon of the kind of "men" that the School of Behaviorism would have to accept as satisfying their theories! ("Men or Robots?" 1925, Powell Lectures.)

The *dénouement* is humanistic enough. The robots somehow develop a will to power; they rebel in distaste at the varied reactions of the more highly endowed humans, and take over the Works in a riot that wrecks the planned economy. Two robots, male and female, having outgrown the rigidity of machines and developed romantic love, effect their escape to a new freedom from regimentation and deterministic necessity, presumably to exemplify in themselves and their descendants those higher non-utilitarian and spiritual privileges of adjustment which the audience is happy to recognize as the inimitable essence of human character. (Man scores against the machines!)

What was wrong with both dramatic plots was that they glossed over the fact that there would be really nothing to fear from technology, whether through the Frankenstein-like building of living machines out of Carrel's undying chicken tissues, or through refinements of electro-mechanical robots, provided there were a corresponding extension of the engineering point of view to the psychological realm of self-mastery, in a new supremacy of scientific rationalization. We cannot, however, carp at literature and the stage for overlooking scientific ideals of harmony, or blame them for entertaining us by false contrasts like determinism vs. free will, corporeality vs. spirituality, machinery vs. man. Contradictions stir the imagination; conflicts are the warp and woof of drama; recreation is their object; the play's the thing!

The theater mirrors many needless disharmonies of sentiment in the folkways which perpetuate the historical lag in mental science. Outside of the theater an appeal should be made to the educated classes to help raise the general level of comprehension concerning personality problems by discouraging faddists of the "psycho" variety. Objective treatment of the phenomena of emotion and of reasoning must emulate engineering analysis, which cool-bloodedly considers all sides of a problem and provides definite standards for the presentation and evaluation of data. The approach is that of the famous *esprit géométrique* of Pascal's time (Continued on page 114)

For Christmas



AN ETCHING OF M. I. T.

By Louis Conrad Rosenberg

PUBLISHED BY THE TECHNOLOGY REVIEW

MR. ROSENBERG, one of the few great American etchers, and a graduate of M.I.T. ('13), has executed a plate of the Institute's Main Group of Buildings that admirably exemplifies his supremacy as an etcher of significant architectural form. . . . Only a few of the one hundred and seventy-five prints that were pulled before the plate was destroyed, are now available at \$35.00 each. . . . The size of the etching is 13" x 8" and each print is mounted with a mat, size 22" x 16½", ready for framing. Each print is signed by Mr. Rosenberg.

TWO INSTALLMENT PLANS OF PURCHASE

If desired, an etching may be purchased on the installment plan, \$16.00 with order and two \$10.00 payments due on February 1 and March 1; or if you prefer \$6.00 with order and six monthly payments of \$5.00 each. The etching will be shipped upon receipt of the first installment.

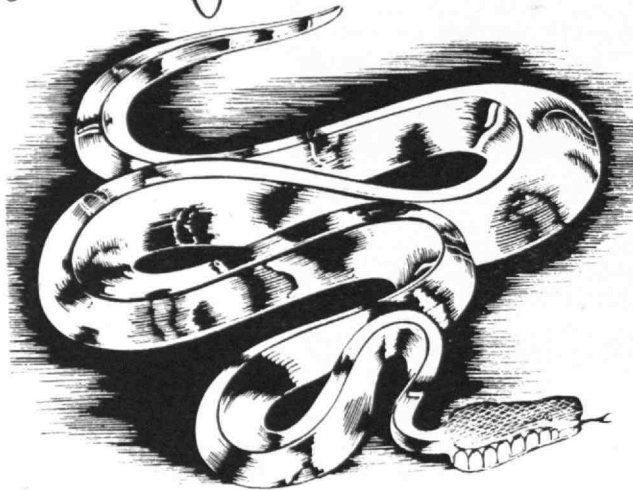
DELIVERY BY RETURN MAIL

Address inquiries or orders to THE TECHNOLOGY REVIEW, Room 11-203, M.I.T.
CAMBRIDGE, MASSACHUSETTS

balanced spiral belt

Reg. U. S. Patent Office

is as flexible as a



The free movement of the loop of the spiral on the crimped reinforcement member makes this belt the most flexible woven metal belt yet devised. Other important features of the Balanced Spiral (U. S. Pat. No. 1,952,873)



Conveyor Belt are true running, constant flatness, ability to hold its width and not elongate. Because of the variety of metals used Wissco Belts are made to overcome unusual conditions including elevated temperature.

Consult the Wissco engineer. Send for the questionnaire and new conveyor handbook.

Wickwire Spencer Steel Company, 41 East 42nd Street, New York City; Buffalo, Chicago, Worcester; Pacific Coast Headquarters: San Francisco; Warehouses: Los Angeles, Portland, Seattle. Export Sales Dept.: New York City.

WISSCO CONVEYOR BELTS

Wickwire Spencer Steel Co.
41 East 42nd St., New York City

I would be pleased to receive one of your new Handbooks on Metal Conveyor Belts.

Name
Company
Address TR

EVERYTHING IMPROVED BUT THE MIND

(Continued from page 112)

and is abundantly exemplified by *articles de fond* appearing in such journals as *The Technology Review*. It is impartial; its spear knows no brother; and it penetrates the minutiae of a machine or the uniformities of the universe by devices that are as appropriate for insight into mentality as into materiality. It was the philosophy of a railroad civil engineer, Herbert Spencer, that gave his many followers freedom from hoary dilemmas, such as the puzzles whether the chicken or the egg came first, and whether rigid necessity or capricious chance rules our lives, and whether heredity or environment is paramount in building character. More cutting of such Gordian knots, as when resorting to a third alternative in those arguments, would liberate thinking men to attend to their real concerns: the integrating of economic life and the harmonizing of social dispositions.

Psyche at the Tower of Babel

It has been wisely said by Lord Dawson of Penn, physician to King George V, that "mind training needs more and more to be a prominent aim of both medicine and education, in order that people may be equipped to deal with the feverishness of their environment." ⁹ But how meet the need when prominent schools still revel in mutual contradictions?

The Behaviorists profess to get along without consciousness, as if saying with Cabanis, "Thought is a secretion of the brain." They overemphasize Pavlov's experiments in "conditioning" dogs to salivate at the sound of a bell, in substitution for the normal stimulus of food. Stretching this idea, Pavlov himself exhorts the Russian people to cherish the "reflex of purpose" — which is a flat contradiction in terms. Purpose is not human, but of a lower order of life, when it becomes stereotyped like a reflex; except that in humans it is seen as mania or dementia. The mind is not comprehended till it is visualized in the many-sidedness and flexibility of its hierarchy of mechanisms.

On the other hand, Freud has overloaded mentality with a mythological "Censor," a "Desexualized Eros," and multiple entities of the 'sciousness variety: fore-conscious, unconscious, and even superconscious. Despite these shifting theories, Freud has publicized the fact that emotions, as well as salivation, can become hooked up with particular stimuli (sights, sounds, or any kind of memory) to form the much-discussed "complexes."

Let us not imagine, however, that these teachings hold any essential novelty except in their richness of detail, their one-sidedness, and the resulting conflict between the two schools.

Three hundred years ago Descartes cited instances that cut both ways into the Pavlovian habit reflexes and into the Freudian complexes. He recorded having had a mental bias in his appreciation of beauty, whereby he was inclined to see beauty in any cross-eyed person, due to the fact that as a child he had greatly fancied a little girl who exhibited this defect. To show the malleability of emotion, he dwelt on (Continued on page 116)

ESTABLISHED 1818

Brooks Brothers,

CLOTHING,

Gentlemen's Furnishing Goods,

MADISON AVENUE COR. FORTY-FOURTH STREET
NEW YORK

Christmas Gifts from Brooks

A Christmas booklet illustrating and describing a great variety of gifts from Brooks Brothers is just being issued. Write to our New York store, and we shall be glad to send you a copy . . . together with a convenient check list of several hundred articles grouped in price classifications from "More than \$50" to "Less than \$5." You will find them helpful in selecting Christmas gifts for men and boys . . . and needless to say, you will find every article, whether its price is large or small, of that Quality which has made Brooks name one of the most famous of its kind in the world.

BRANCHES

NEW YORK: ONE WALL STREET
BOSTON: NEWBURY COR. BERKELEY STREET



INFORMATION ON M.I.T.

THE TECHNOLOGY REVIEW BUREAU exists to supply authoritative information to anyone interested in details regarding the Massachusetts Institute of Technology. It serves as a clearing house for inquiry and aims to further the spread of exact information regarding entrance requirements, outline of courses, subjects of instruction and other information which may be of aid to the students considering undergraduate or graduate study at the Institute.

The Institute publishes a variety of bulletins, as well as a catalogue of general information essential to the entering student. The Technology Review Bureau will be glad to send, gratis and post free upon request, one or more copies of any publication listed below, or to forward any special inquiry to the proper authority.

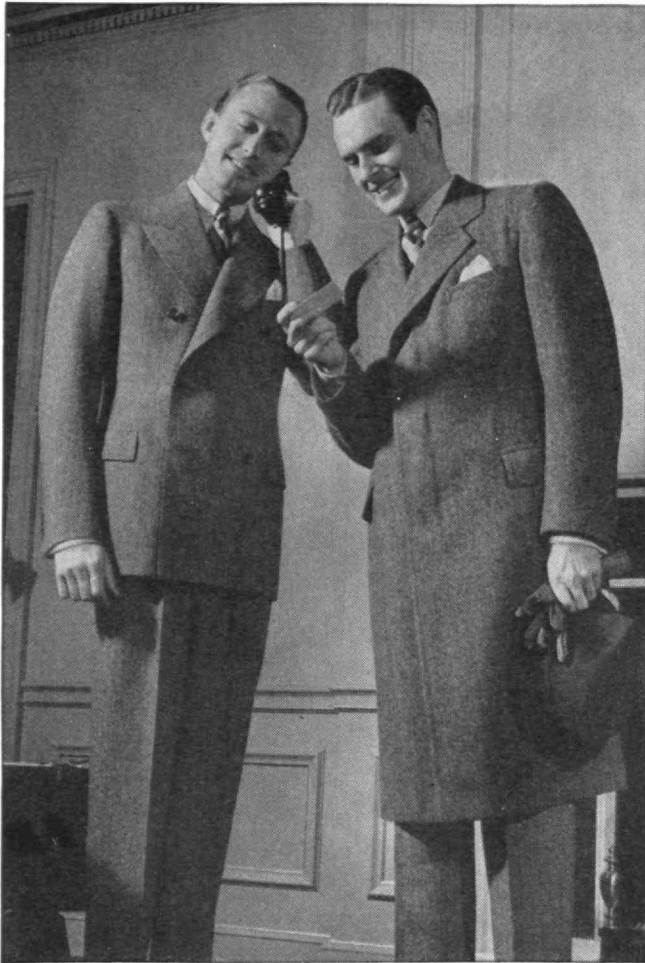
Ask for the following pamphlets by their descriptive numbers

- | | | | | |
|--|---|---|--|---|
| 1: For general information, admission requirements, subjects of instruction, ask for Bulletin 1. | 2: For announcement of courses offered in Summer Session, ask for Bulletin 2. | 3: For information on courses in Architecture, both Undergraduate and Graduate, ask for Bulletin 3. | 4: For information on Graduate Study in Science and Engineering, ask for Bulletin 4. | 5: For a popular presentation of Educational Opportunities offered at M.I.T., ask for Bulletin 5. |
|--|---|---|--|---|

All inquiries sent to the address below will receive prompt attention

THE TECHNOLOGY REVIEW BUREAU

ROOM 11-203, MASSACHUSETTS INSTITUTE OF TECHNOLOGY, CAMBRIDGE, MASS.



What you never see is what makes Rogers Peet clothes look so well!

Men who buy Rogers Peet clothes take good hand-tailoring for granted—the way they take the motor under the hood for granted. But like auto salesmen who tell you about carburetors and distributors, we often “get that way” about our kind of needlework.

It's *hand-work*—shape-building needlework done in the basting—that gives Rogers Peet clothes their permanence of style. The basting comes out; you never see it; but the care that goes into that basting is what makes your Rogers Peet suit or overcoat look so well.

Rogers Peet suits, \$45 to \$95.
Rogers Peet overcoats, \$45 to \$125.

Rogers Peet Company

In New York:
Fifth Ave. at 41st St.; B'way at Liberty, Warren, 13th and 35th Sts.
In Boston: 104 Tremont St. at Bromfield

EVERYTHING IMPROVED BUT THE MIND

(Continued from page 114)

the fact that dogs have natural instigations to run after birds and to run away from a gun when it is fired, yet nevertheless are commonly so trained “that the sight of a partridge makes them couch, and the noise of a discharged piece makes them run to it.”¹⁰ All such observations were documented with a wealth of context and diagrams that not only explained away the paradoxical aspect of body vs. mind, but reconciled them into a single system.

Ranging authoritatively from the simple reflex to the higher powers of cerebration and of conscious thought, Descartes supplied technological models to hint at the interaction of spirit and body as a concept of mind, acceptable to biology and psychology alike. In sum, as Leibnitz says, man is a spiritual automaton.

Why Behaviorists and Psychoanalysts have failed to meet on this common ground is intimated by two moving pictures presenting their respective views. A Russian film, “Mechanics of the Brain,” shows Pavlov's laboratory work on the conditioned reflex. The other, a German film entitled “Secrets of the Soul,” shows a Freudian case analysis of a man who had acquired a strange fear of knives. Neither film had anything to offer as an intellectual bridge between the two modes of approach to the problems of personality. In the Pavlov story, animated dotted lines, superimposed on the anatomical photographs, show the passage of nerve impulses from sensory terminals to brain, and from brain to effector organs—in this case the salivary glands; but the crucial feature, the redirecting of response through central brain switchboards (which Descartes had depicted in his diagrams as relay systems built up among the centrally-meeting nerve fibers) shows in the film as stationary flickers of white. This gives no idea of the gradual process by which the habit reflex is worked into the fabric of nerves (nerve-felt) in the responding brain tissues (see p. 100).

Similarly, the Freudian film oversimplifies the build-up of the phobia allegedly revealed by dream analysis so that no light is thrown on the physiological sequences that must have entered into the formation of the phobia and have been reversed in the “cure.”

In sum, these pictures gave ocular evidence of historical lag in reconciling the “mechanics of the brain” with the “secrets of the soul.”

To bridge this gap (the “psycho-physical parallel”) the philosophers have sought immemorially what they call a “material idea.” In this century, biopsychic research offers the *neuro-idea* as a unifying conception in the mind and body problem. It is a brain network, or spider-web pattern of nerve fibers, which instruments the registration, conservation, and reproduction of ideas.¹¹ The credibility of this concept has gained support from such distinguished philosophers of the organism as Henry Head and Elliot Smith.¹²

Engineering Analogies Disclose Mind's Principles

Priority belongs to Descartes for expounding the principles of brain recording. The Cartesian stencil symbolizes the abstract properties of experiential registration as a patterned opening up and interlocking of a

group of nerve channels. These are conserved as a unit, like punch-hole configurations left in an embroidery canvas by the punctures of a carding comb (see p. 97). The importance of this analogy and of the ideas built around it by the author has not received the credit it deserves, nor have I seen it recognized that the Cartesian brain stencil was an anticipation of the control-devices of the Jacquard loom (1810). This employs a sequence of differently perforated screens to regulate, at each stroke of the loom, the lift (through the apertures) of the little rods in the loom-harness that individually raise a warp-thread and so govern the working out of the textile pattern. In Descartes' stencil, the apertures represent simply openings in the nerve ducts to give passage to nerve impulses in combination. Of course, the stencil itself does not travel; it simply suggests a gang switch which can be pulled to open the entire group of channels as soon as any one section — a, b, c, or d — is "reached."

The important feature is the concept of the grouping of conduction paths, and the implied mathematical possibilities of permutation and combination by switching.

This analogy and others connected with it by Descartes bring us to the principle of the Hollerith system, by which data are recorded on punched cards which can be mechanically selected (by electric sorting) according to their punch-hole characteristics. More analogous to the operation of brain records is the fact that in the Hollerith machine any card carrying certain desired registrations can be "found" by setting up a plugboard, like a telephone panel, to monitor the selector switches.

Today neurologists realize that a selective pick-up system of the switchboard type must be an essential feature of brain traffic. Yet not one student of psychology in a hundred is given an opportunity to familiarize himself with the long history and gradual evolution of concepts like these, which entail an engineering view of the interaction of mind and body. Such a neglect is, in part, symptomatic of the historical lag; but some of it undoubtedly is inertia attributable to the heavy call that mechanistic analogies make upon the engineering imagination of non-engineers!

The other part of Descartes' exposition is simple enough. It includes the pipe-organ analogy, according to which the brain central or switchboard resembles the organ's wind chest, where are banked together the valves of the tubes that lead to tone pipes — representing the *output* nerve ducts from brain to muscles, et cetera. These valves are acted upon from the console according to the strokes on the keyboard, which is compared to the gamut of possible sensory impressions carried by the *input* nerves led in to the brain central.

Such an instrument would have no memory unless a recording system were supplied in some such form as suggested by the Cartesian Brain Stencil. In a pipe organ this could operate centrally on the plan of a pianola roll, as distinguished from the individual key action at the console.

Rôle of Consciousness in Servo-Mechanism

To complete the manikin's facilities for behaving like a man, Descartes supplied a centrally-placed pineal body, describing it in a way to (*Concluded on page 118*)

Should Engineers Buy STOCKS?

M.I.T. twenty-two years ago established Course XV. The Institute then recognized that Business Administration is of vital importance to engineers.

We now ask another question: Has the time come when engineers should inform themselves on the more efficient control of investment funds?

Both as individual investor and professional consultant, a *fully* equipped engineer should master the *fundamentals of finance*.

Believe it: Not a wheel can turn or even a pencil move on the board unless the necessary funds are put up by bondholders, stockholders, — or tax payers!

Is not an engineer too narrow a specialist if he lets himself become so absorbed in construction and production data that he loses intelligent contact with the "end figures", which are FINANCIAL.

Certain fundamentals of investment — like engineering — can be secured only through employing experts. We should like to bring to your attention certain basic principles acquired over more than thirty years of practical experience.

Good engineers should be good business men, and for you we have a booklet entitled "Should Business Men Buy Stocks?" Many who may have felt that the purchase of stocks means dabbling in the market have gained new respect for the subject after reading this report. A copy will be sent to you gratis on request.

Babson's Reports

DIV. 100-114

Send gratis your booklet entitled "Should Business Men Buy Stocks?"

Name

Address

.....

EVERYTHING IMPROVED BUT THE MIND

(Concluded from page 117)

conform closely to the present-day conception of the servo-mechanism.¹³ A focus for consciousness, this kernel is represented as oscillating in the act of compounding impulsions affecting it from various sources. In general, it embodies principles represented today in a variety of calculating and monitoring devices. It would be interesting to learn how far the inventor of Analytic Geometry could have been acquainted with servo-mechanisms in the technology of his day.

In any case, the manikin symbolized correctly the hierarchy of control in thinking, feeling, doing: the simple reflex, the commutable memory-record, and the super-direction that is close to the Field of Awareness. This accords with the doctrine of nerve levels which, as expounded by the late Dr. Hughlings Jackson, shows that Nature has added on device after device to form the present human nervous system and embody in it "basic patents" for improved adjustability during hundreds of millions of years. The broad features are on view in museums of natural history. And the wiring schemes of the nerve system have been charted from the microscope — piecemeal. There's the rub. What with more than ten billion nerve cells in the brain alone, they cannot all be seen in bird's-eye view; but, spread out, they would be comparable to the entire telephone system of North America multiplied many times.

Yet a clinician like the famous Dr. Pierre Janet has been able to translate this wiring system and instrumentation of relays into a concept of biopsychic reactions functioning at Hughlings Jackson's levels.¹⁴

Here is where we must face the fact that the most important and the most neglected help to general culture is the visualization of mentality, in all its pyramided levels. By means of models, animated diagrams, or cinema, used in the ordinary way, much could be done; but it would only be "first aid."

Fortunately, the advance in our technology is so great that a hierarchy of instruments and switchboards and servo-mechanisms could be assembled to symbolize the instrumentation of nerves on which the brain traffic depends. Indeed, a complete working model, suitable for public exhibition, could be built from a selection of the apparatus exhibited at the Annual Open House of the M.I.T. In this assembly it would be necessary to make special arrangements for showing the brain traffic created by sentiments and emotions. That would mean interrelating the models of the thalamic region (core of the brain, as it were) and the cortex, the intellectual terrain. It is only recently that the thalamic region has been recognized as the essential focus of emotion.¹⁵ Nevertheless, the blue print of the body-and-mind relations, laid out in the foregoing statement, could easily accommodate the above-mentioned thalamo-cortical circulation as conceived by Sir Grafton Elliot Smith and George T. Campion.¹⁶ (See also diagram, p. 99.)

If practical models, imitating the mechanisms herein referred to, should be composed for demonstration, the exhibit would rival the now so popular Planetarium.

I believe a "Mentarium" would prove of equal attraction and could play a more intimate part in improving folkways.

The Mentarium would at last realize the objective that Descartes had in mind when he wrote: "Now these things are profitable to know, to encourage everyone to study the regulation of his Passions. For since with a little art the motions of the brain in beasts, who are void of reason, may be altered, it is evident they may more easily in men, and that even those who have the weakest Souls, may acquire a most absolute Empire over all their Passions if art and industry be used to manage, and govern them."

The Mentarium could afford a true visualization of biopsychic (body-and-mind) reactions. The insight thus given to individuals would aid them in dealing with corresponding functions in themselves. The removal of perplexities about Personality, hanging over from ancient times, would set free the Spirit of man to realize those internal and external harmonies of which the visible self is but the instrument.

REFERENCES

1. Jevons, W. S., "The Principles of Science," Macmillan, London, 1874. Chap. xxiii The Use of Hypothesis.
2. McDougall W., *Proc. Brit. Assn. Adv. Sc.*, 1934. Jastrow, J., in *American Scholar*, June, 1935; *Scientific Monthly*, August, 1935, "The Current Chaos in Psychology."
3. Moore, Dom. T. V., "Dynamic Psychology," Lippincott, Phila., 1924.
4. Sherrington, Sir C. S., "Some Aspects of Animal Mechanism," *Brit. Assn.*, paraphrase in *Lancet*, Sept. 6, 1922.
5. Aristotle, "On the Movement of Animals," Chap. 7, § 7.
6. Descartes, René, "De L'Homme," Art. 16, Paris, 1664, also Adam & Tannery, ed. Works.
7. Locke, John, "Essay Concerning Humane Understanding," 1690-1705.
8. Loeb, Jacques, "Physiology of the Brain," Putnam, N. Y., 1900.
9. Carrel, Alexis, "Man, The Unknown," Harpers, N. Y., 1900.
9. Dawson, Lord — of Penn, *Proc. Med. Soc. of London; Lancet*, Oct. 28, 1922.
10. Descartes, René, "The Passions of the Soul," Art. 50, Amsterdam 1649, London, trans. 1650.
11. Prince, Morton, "The Unconscious," Macmillan, 1914, 1921.
12. Smith, Sir Grafton Elliot, citing Head, Sir Henry, "Aphasia," Cambridge, 1926; Also, Horton, L. H. W., "Prince's Neurogram Concept" in "Problems of Personality," Harcourt, Brace & Co., N. Y., 1925; Kegan Paul, London, 1925.
13. Hazen, H. L., "Servo-Mechanisms," *Technology Review*, July, 1933.
14. Janet, Pierre, "Principles of Psychotherapy," Macmillan, 1924. Jackson, J. Hughlings, "Evolution and Dissolution of the Nervous System," London, 1884.
15. Cannon, W. B., "The Wisdom of the Body," W. W. Norton, N. Y.; Routledge, London, 1932.
16. Smith, Sir Grafton Elliot, and Campion, G. T., "The Neural Basis of Thought," Kegan Paul, London; Harcourt Brace, N. Y., 1934.

GENERAL CITATIONS

- Pavlov, Ivan P., "Lectures on Conditioned Reflexes," Intern. Pub., N. Y., 1928.
Freud, Sigmund, "The Ego and the Id," Hogarth Press, London, 1927.

MORNING FACE IN THE BERKSHIRES

A small boarding school for boys and girls from four to fourteen. Prepares for leading secondary schools. Men and women teachers who understand children. Intimate home life.

for information address

MRS. ELEANOR RUNKLE CRANE, Director, Richmond, Mass.

FLYING FOUR THOUSAND MILES

(Continued from page 96)

Tom Smith's last message to the world; it could not have been many days after writing this that he was drowned in Liard River, one of the most difficult and dangerous streams in the north country.

Below Tom Smith's notice was another notice, dated March 25, 1929, four years after Smith's departure, signed "Les and Fred," indicating that they were proceeding to Wind River, a stream joining the Liard a few miles higher up. Who Les and Fred were I have not found out, but they were presumably trappers. Later in the day, we flew over Tom Smith's cabins and the meadow and were able to locate the hot springs, about 300 yards west of the cabins.

The name "Tropical Valley" is a misnomer. There are here no palms or other tropical plants, no dinosaurs or mammoths that are everywhere else extinct, simply a rank, luxuriant vegetation, resulting from a subsurface irrigation emanating from the adjacent springs.

Such springs are not uncommon in the region. They are known on Toad River about 15 or 20 miles south of Liard River, and again on the Nahanni about 15 miles above the mouth, where the water is quite hot. Two other localities which appeared from the air to be springs were noted on our flights, one on each side of the river at the Devil's Gorge, but whether these were of hot or cold water we could not determine because of the difficulty of landing nearby. Why springs occur at these

points and the reason for their temperature are questions that can be settled only by a more detailed study than we could give them.

While the whole trip must have been very interesting to my fellow travelers, to me it was most fascinating. Sitting in a comfortable chair in a smooth-riding plane, expertly handled by Punch Dickens, who seemed to have an uncanny sense of always knowing where he was or where he was going, even in territory he had never seen before, the scene rolled by below bringing up incidents of 35 or more years ago, many of them amusing, some tragic, others exciting, but all of them stirring my memory in a way that could not affect anyone else.

For example, there at Klootchman Canyon on the Stikine, in March, 1899, I spent three days, snow-blind, in a trapper's cabin, when my host thought it most amusing to extinguish the candle at night with a shot from his rifle. There, at another point, I shot two moose in January and I made the coldest camp of my experience at 52° below zero with just a single blanket. There, lived my friend who confessed that he could be tried for murder if caught, but who proved to be a most hospitable host who resented your passing his cabin. There on the top of the Devil's Portage, overlooking the Grand Canyon of the Liard Valley, Pelly and I spent Christmas, 1897, when on the road to the Klondike. There, I first met the famous explorer, Warburton Pike, who was occupied in chasing a squirrel with much noise from tree to tree. There was the site of the old Fort

(Concluded on page 120)

PREPARATORY SCHOOLS FOR BOYS

BERKELEY PREPARATORY SCHOOL

Established 1907

Special Preparation for M. I. T.

Day School — for Boys: Evening Session — Coeducational

HARRY F. CADE, JR., '28, *Principal*

1089 Boylston Street, Boston

Tel. Commonwealth 9262

CHAUNCY HALL SCHOOL

Founded 1828. The School that confines itself exclusively to the preparation of students for the Massachusetts Institute of Technology.

FRANKLIN T. KURT, *Principal*, 553 Boylston Street, Boston, Mass.

HEBRON ACADEMY

Thorough college preparation for boys at costs surprisingly low due to endowment and country location. Graduates in 32 colleges. Experienced faculty of 15 men. Excellent dormitory, classroom, laboratory and athletic equipment. For book, "Building Scholarship," address

RALPH L. HUNT, *Principal*, Box T, Hebron, Maine

HUNTINGTON SCHOOL FOR BOYS

Five Forms. Special two-year course for entrance to M. I. T.

Summer Session (Co-educational)

Send for catalogues

CHARLES H. SAMPSON, Ed.M., *Headmaster*

320 Huntington Ave., Boston

Tel. Kenmore 1800

MOSES BROWN SCHOOL

An Endowed New England School with an excellent record in preparing boys for leading colleges. 25-acre elm-shaded campus. Athletic Fields. Gymnasium. Swimming Pool. *For Illustrated Catalog Address:*

L. RALSTON THOMAS, *Headmaster*, 257-A Hope Street, Providence, R. I.

NEW HAMPTON SCHOOL

115th year. A New Hampshire School for Boys. Six Modern Buildings. Thorough College Preparation. Junior Course in Business. Athletics for Every Boy. Moderate Tuition. *Address*

FREDERICK SMITH, A.M., Box 198, New Hampton, N. H.

NORTHWOOD SCHOOL

In the heart of the Adirondacks. Under Lake Placid Club Education Foundation. Unusual success in college preparation. Emphasis on recreation that can be continued throughout life. Winter sports. Separate junior school for boys, 8 to 12.

IRA A. FLINNER, Ed.D., *Director*, Box T, Lake Placid Club, N. Y.

SHATTUCK SCHOOL

A Church school for boys. 75th year. Stands high among schools for sound scholarship, manly character and Christian citizenship. Military training. Sends boys to M.I.T. each year.

Address The Headmaster, Faribault, Minn.

FLYING FOUR THOUSAND MILES

(Concluded from page 119)

Halkett, abandoned by the Hudson's Bay Company in 1865, because they could not get natives, even with double pay, to traverse the dangerous waters of the Liard River, and so the route, as a trade route, was abandoned and never restored.

At Fort Liard it was interesting to see the house in which I was born, a four-room log house, stoutly built, but now rotting at the foundations and the cause of complaint to the occupant, to whom the building meant nothing but a place in which to live. On the Mackenzie River side of the mountains, incidents of this kind were brought to memory in rapid succession. At Norman, for example, I remembered standing on the bank of the river, a youth of 19 years, watching with a feeling of loneliness the steamer round the point to the south on the 10th of August, knowing at the same time that my contact with the world was cut off until the middle of April, when the winter packet came down.

Again, flying over the barrens from Great Bear Lake to Coppermine, I recalled the experiences of 35 years before when Mackintosh Bell and I sat in the shelter of a boulder in a snow storm in August and wondered whether or not we should even get out alive. A short distance away, two priests were killed a few years later. Still farther along was the scene of an encounter with a polar bear which had me with my back to a cliff and no means of attack or defense.

There was the point where, in 1900, we noted the occurrence of cobalt bloom on the east shore of Great Bear Lake, and where Gilbert LaBine, 30 years later, made his important discovery of radium-bearing ore. There again on the north arm of Great Slave Lake, my younger brother was drowned, breaking through the ice of the lake on a winter trip.

These and many other points along the route revived incidents of great interest to me and made the whole trip one of the outstanding experiences of a life which has been fairly full of adventure.

ADVENTURES IN A VACUUM

(Continued from page 103)

has been estimated that on the Washington-New York demonstration the deviations between the scanning and distributing disks were less than if they had been connected together by a one-inch steel shaft six feet long.

The applications of the vacuum tube are by no means limited to electrical communication and its associated activities, although it is probably true that telephony and, more recently, radio, have furnished the chief incentives for its development. Once its possibilities became known, it was called in to smooth many rough paths in fields far removed from the transmission of intelligence. In none of these enterprises is the vacuum tube prosaic. It seems destined always to do the incredible.

We might follow the vacuum tube into the astronomical observatory and watch it at work guiding a giant telescope so that the image of some distant star remains fixed in position on a photographic plate during an exposure lasting for hours. Here the problem is to apply

corrections to the motion of the telescope as strata of air of different densities pass before its lens and cause the star to appear uncertain of its course. In this same observatory we find the vacuum tube acting as the escapement for a pendulum consisting of a tiny plate ground from a piece of crystalline quartz. This pendulum swings a million times a second and is little disturbed by changes in temperature or air pressure, by vibration, or by any of the other distractions which heretofore have made the astronomical clock one of the most delicate of all instruments devised by man.

On the bridge of an ocean liner we find our vacuum tube constantly reporting the depth of water beneath the keel as the ship steams at full speed. It is also on the alert for the presence of icebergs. In time of war it listens for the beat of a submarine's propeller and, when found, indicates its bearing.

We find it in factories measuring the rate to which watches are adjusted in the time it takes them to pass on a belt conveyor. It is now no longer necessary to hold two weeks' output of watches in stock just to find out whether they are accurately set or not. The vacuum tube travels into the oil fields with the prospector and makes as good a guess as anyone as to where oil may be had.

In the doctor's office it observes the minute electric waves by which the muscles of the heart signal to each other and gives clinical evidence of the condition of that organ. In the hospital it watches these same heart waves and times the exposure of a high-speed x-ray apparatus so that snapshots of the heart may be taken at any desired phase of its action. In the operating room it taps a telegraph sounder in rhythm with these waves so that the surgeon may know how the heart is behaving as he modifies its environment. Or perhaps the anæsthetist prefers to watch a dial in silence. It is all one to the vacuum tube, which then indicates the pulse rate on an instrument looking for all the world like the speedometer on your car (an important difference is that the pulse-rate indicator is the more accurate).

In all of these applications, it is evident that we are dealing with minute amounts of electrical energy. Does this indicate that the vacuum tube is content to satisfy itself merely with big numbers? Not at all. It can distinguish itself in the field of high power quite as well as in the laboratory of refined measurements. Here, as elsewhere, the vacuum tube does its assigned task with the least possible fuss.

One of the most treacherous jobs in high-power work is the emergency opening of a circuit carrying the load of one of the modern, heavy-duty generators. The switches used for this purpose are exciting pieces of machinery. For the larger generators, the circuit breaker occupies as much space as a small house. It is built of six-inch I-beams and is operated by gigantic springs. It is the function of these springs to withdraw suddenly a heavy copper block weighing a hundred pounds or so from the gap between two massive plates to which the circuit is connected. On test, these breakers are chained to the ground, not in the hope of holding them rigidly in place, but so that they may not jump too far when they operate. Consider one of these circuit breakers carrying the load of a big turbo-alternator. The load is increased

slowly to the danger point. The breaker is about to let go. Everyone moves as far away as he can get; the fire crews stand by with hose and extinguishers. The switch trips. There follows an explosion that would do credit to Black Tom, and a sheet of blue-white flame enshrouds the entire breaker. Molten copper from the short-circuiting bar spatters over the adjacent territory. Laboriously the equipment is repaired and made ready for its permanent installation in a fireproof vault, where it is placed with a prayer that it may rest in peace.

This, you might well conclude, is no job for a vacuum tube. Remember, however, that the vacuum tube is always subtle. This high power from the turbo-alternator does not flow continuously in one direction, but alternates back and forth. With the usual 60-cycle current, then, there are 120 times during each second when the current has just stopped flowing in one direction and has not yet started to flow in the other. Short as this time is, it is quite long enough for the vacuum tube. In place of the huge structural-steel contraption, then, we have two glass bulbs, about the size of basketballs. These have glowing filaments, plates, and just enough gas to help things along. They also have grids. Because of the gas, however, these grids are not able to vary the intensity of the current as they do in the high-vacuum tubes. Once the current has started, the grid loses (*Concluded on page 122*)



Transits and Levels are used on all largest works and by U. S. Govt. for utmost precision.
New catalog, just issued, sent gratis
BUFF & BUFF CO. Boston 30, Mass.
 Handsome nickel bas-relief of a Buff Transit sent gratis to engineers

WILLIAM P. BERKELEY


M. I. T. '27

*Equitable Life Assurance Society of
the United States*

100 Milk Street, Boston

Room 1022

Hancock 6200

SUPPER ROOM
 DINNER and SUPPER DANCING
 Music by
HOWARD LALLY and his
 Famous "Roberta" Orchestra
SPARKLING ENTERTAINMENT
 Large, comfortable, airy rooms for single
 or double occupancy at moderate rates

Reservations
 MUrray Hill 2-7920
 Room 100

THE BILTMORE... MADISON AVE. AT 43RD ST., NEW YORK

AMERICA LEADS in telephone service

because of one policy, one system and universal service. More than 50% of the world's telephones are in the United States.

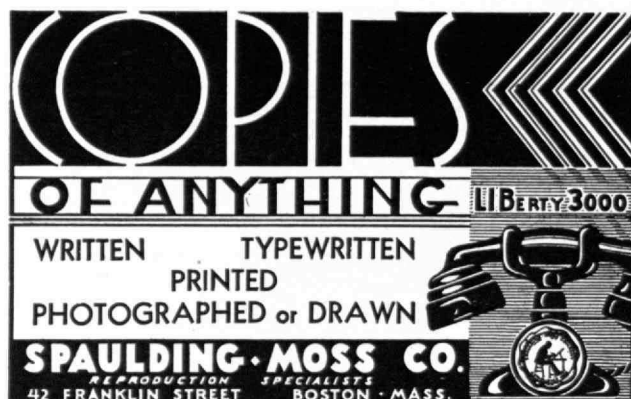


Bell Telephone System

Boit, Dalton, Church & Hamilton INSURANCE

89 BROAD STREET
BOSTON, MASS.

85 JOHN STREET
NEW YORK, N. Y.



COPIES
OF ANYTHING LIBERTY 3000

WRITTEN TYPEWRITTEN
PRINTED
PHOTOGRAPHED or DRAWN

SPAULDING-MOSS CO.
REPRODUCTION SPECIALISTS
42 FRANKLIN STREET BOSTON MASS.

MERRIMAC CHEMICAL COMPANY

Subsidiary of Monsanto Chemical Company

EVERETT
MASSACHUSETTS

*The largest and oldest
chemical concern in New England*

Founded in 1853

THE RUMFORD PRESS

Concord, New Hampshire

*Makers of Magazines and Books
of Distinction*

William H. Coburn, '11 John K. Phelan, '27 William F. Dean, '17

William H. Coburn & Co.

INVESTMENT COUNSEL

68 Devonshire St.

Boston, Mass.

ADVENTURES IN A VACUUM

(Concluded from page 121)

all control over it. On the other hand, if the grid is held at a sufficient voltage, the current can never start. When there is no voltage on the grids, these two tubes can carry all of the electrical energy required for a city of 10,000 homes. One tube carries the surges in one direction and the other tube carries them in the other. Suppose, now, that a voltage is suddenly applied to the two grids. In the tube which chances, at the moment, to be carrying the current, nothing happens. The surge completes its swing and tries to start back through the other tube. This second tube is now, due to the voltage on the grid, no longer a conductor and current cannot flow. It turns back and tries again to pass through the first tube. Once it has relinquished its right of way, however, the grid has seized control and the easy path across this tube has also disappeared. In other words, while the current had its back turned, though for less than 1/120th of a second, the grids quietly took up the bridges. The only external evidence that anything has happened is that a soft bluish glow within the tubes has faded to nothing. It is necessary only to remove the voltage from the grids for the circuit to be restored to its normal working condition and to be ready for a second operation.

These examples have been chosen to illustrate the versatility of the vacuum tube and something of the remarkable quantitative limits to which its operation may be carried. Numerous and varied as are its present uses, it is evident, however, that they represent only the beginning of the utilization of this remarkable device. Both the type of tube and its application are increasing in number at a constantly accelerating rate. Its use is fast becoming a distinct art in its own right. The wildest imagination is hardly adequate to dream of its future effect on the world in which we shall live tomorrow.

THE TREND OF AFFAIRS

(Concluded from page 93)

conveniences, and improvements of which today it has no dreams.

Inevitably one wonders what the bankers, brokers, and vice-presidents think about all this. No technical men these, are their minds so confused with microns, protons, electrons, turbidimeters, nefretometers, seismographs, polymerized esters, and coaxial cables that their nightmares will take on new and more awesome forms? Or will they go back to their companies determined that policy will require them to take a more active and lively interest in research, perhaps even to do some? And again, if they go and do likewise and things don't go smoothly, will they recall Dr. Mees' Parthian shot: "Remember, all research is a gamble"?

GIVE THE REVIEW FOR CHRISTMAS

Subscription price, \$3.50

A presentation card will be sent with gift subscriptions

PROFESSIONAL CARDS

JACKSON & MORELAND

Engineers

Public Utilities — Industrials
 Railroad Electrification
 Design and Supervision — Valuations
 Economic and Operating Reports

BOSTON

NEW YORK

FAY, SPOFFORD & THORNDIKE

ENGINEERS

BOSTON, MASS.

BRIDGES

WATER SUPPLY AND SEWERAGE

PORT AND TERMINAL WORKS

FIRE PREVENTION

INVESTIGATIONS

DESIGNS

SUPERVISION OF CONSTRUCTION

H. K. BARROWS, '95

M. Am. Soc. C. E.

CONSULTING HYDRAULIC ENGINEER

*Hydro-electric developments — Water supplies. Reports, plans,
 supervision. Advice, appraisals.*

6 BEACON STREET

BOSTON, MASS.

STANLEY G. H. FITCH '00

CERTIFIED PUBLIC ACCOUNTANT

of PATTERSON, TEELE & DENNIS

1 Federal Street, Boston, Mass.

Cost Accountants and Auditors — Tax Consultants

NEW YORK

BOSTON

WASHINGTON

REPRESENTATIVES IN OTHER PRINCIPAL CITIES OF THE
 UNITED STATES, CANADA, ENGLAND AND AUSTRALIA

EADIE, FREUND AND CAMPBELL

CONSULTING ENGINEERS

110 WEST FORTIETH STREET

NEW YORK CITY

PLANS AND SPECIFICATIONS — EXAMINATIONS AND REPORTS

Power, Heating, Ventilating, Electric, Plumbing, Sprinkler, Refriger-
 ating, Elevator Installations, etc., in Buildings and Industrial Plants

J. K. CAMPBELL, M. I. T. '11

MAURICE A. REIDY

Consulting Engineer

STRUCTURAL DESIGNS

FOUNDATIONS

CONSTRUCTION CONSULTANT AND ARCHITECTURAL ENGINEER

Estimates and Appraisals

44 SCHOOL STREET

BOSTON, MASS.

BURTON W. CARY '08

MELVIN R. JENNEY '21

FISH, HILDRETH, CARY & JENNEY

Attorneys-at-Law

SPECIALIZING IN

PATENT AND TRADE-MARK PRACTICE

53 State St., Boston

Hubbard 2496

EVERETT E. KENT

PATENT LAWYER

Patents, Trade Marks, Copyrights

United States and Foreign

75 Federal Street, Boston

HUBbard 0234

ROBERT McC. SIMONDS

M. I. T. '24

Attorney-at-Law

PATENT PRACTICE
 EXCLUSIVELY

120 Broadway
 New York

THOMAS B. BOOTH '95

AMASA M. HOLCOMBE '04

EMERY, BOOTH, TOWNSEND, MILLER & WEIDNER

50 CONGRESS ST., BOSTON, MASS.

EMERY, BOOTH, HOLCOMBE & MILLER

MUNSEY BLDG., WASHINGTON, D. C.

PATENT LAWYERS

AN AID TO INDUSTRY IN LOCATING OUTSTANDING MEN

YOUR EXPERIENCE AND THE FUTURE

Employers are turning to the M.I.T. Placement Bureau in increased numbers for men to fill important positions—positions demanding men with ten to twenty years' experience along specific lines, as well as recent graduates. At times we are at a loss to suggest the right man for a position, not because there are no alumni who have the precise qualifications, but because we do not have a complete record of that particular man's experience.

Will tomorrow bring you one of these unusual opportunities, or shall we recommend someone else because we have no knowledge of that background of experience which may make you the right man for the opening which we must fill?

Our service to you as well as our service to industry is a function of the completeness of our records. If you have not done so recently, write us today and bring your record up to date.

Inquiries regarding this service should be addressed to

PLACEMENT BUREAU
MASSACHUSETTS INSTITUTE OF TECHNOLOGY
CAMBRIDGE, MASS.

AN AID TO ALUMNI IN FINDING DESIRABLE POSITIONS

TECHNOLOGY MEN IN ACTION

CHECK-LIST OF THE ACTIVITIES AND ACHIEVEMENTS OF M.I.T. ALUMNI, OFFICERS, AND STUDENTS

Congratulations

¶ To CHARLES R. RICHARDS '85, on being presented the award of the Michael Friedsam Medal by the Architectural League of New York. The award gives public as well as professional recognition to the varied service of this teacher and leader in the industrial arts to this community and to the nation. Mr. Richards is Vice-President of the New York Museum of Science and Industry.

¶ To MARION TALBOT '88, Professor Emeritus of the University of Chicago, on receiving the honorary degree of doctor of laws from Tulane University, New Orleans, La.

¶ To GEORGE E. HALE '90, honorary director of Mount Wilson Observatory, on being presented the Frederic Ives Medal for 1935, at the annual dinner of the Optical Society in October. The medal was given to Dr. Hale for his development of a method for determining the chemical properties of stars.

¶ To EDWARD C. WENTE '14, on being presented the new Progress Medal of the Society of Motion Picture Engineers, for his work in acoustics and acoustical instruments, with special reference to their application to the recording, transmission, and reproduction of speech and music.

¶ To ROBERT C. DEAN '26, on being awarded \$300, second prize, in the *House Beautiful* magazine annual small house competition.

In the News

¶ ROBERT F. ELDER, professor of marketing, M.I.T., for his opinion on the sales tax. Returning from a visit to 16 states, where sales taxes were in effect, he found that a strong wave of resentment was developing against them even though consumers were as yet unorganized in their opposition. Professor Elder was one of the speakers at the two-day Boston conference on distribution, held under the auspices of the Retail Trade Board of the Boston Chamber of Commerce in cooperation with the Harvard Graduate School of Business Administration, Boston University College of Business Administration, and M.I.T.

¶ CHARLES H. WOODBURY '86, for an exhibition of paintings, drawings,

and prints at Phillips Academy, Andover, Mass. One of Boston's nationally known painters, particularly of the sea, Mr. Woodbury's prints and paintings are owned by museums and private collectors throughout the country. He belongs to a number of art organizations and his work, during the past half century, has received many well-merited prize awards.

¶ WALTER H. KILHAM '89, for an exhibition of water colors at the Copley Society — "The Boston you never see," October 21 to November 1.

¶ ARTHUR W. DEAN '92, on becoming chief engineer of the Massachusetts State Planning Board.

¶ GERARD SWOPE '95, for his opinion on welfare work. Long after the depression has ended, said Mr. Swope, chairman of the 1935 Mobilization for Human Needs which is making a drive for funds to support private welfare organizations in the United States, the bills for it will be coming in, the bills for "repair of damage wrought." By aiding private welfare work, the cost of government aid becomes lessened.

¶ FRANK B. JEWETT '03, on his election as President of the New York Museum of Science and Industry; GERARD SWOPE '95, was elected a trustee.

¶ MAURICE E. DENNY '08, an account of his career in *Modern Transport*, London. Mr. Denny is President of the Institute of Marine Engineers.

¶ ARTHUR C. HARDY '18, on his election as President of the Optical Society of America.

Written

¶ By WILLIAM T. HALL '95, and the late F. P. Treadwell, a translation and revision of Volume II of "Analytical Chemistry," John Wiley.

¶ By IRVING H. COWDREY '05 and RALPH G. ADAMS '11, a book on "Materials Testing — Theory and Practice," John Wiley.

¶ By ALDEN H. WAITT '14, an article in *The Military Engineer* for September-October, on "Chemical Agents in Aid of Demolitions."

¶ By FRANK L. AHERN '14, a pamphlet of safety regulations for emergency conservation work.

¶ By OLIVER WILLIAMS '21, an article in *Forum* for October, on "Peace and Abundance." A New York business

man, convinced that obstruction of international trade will be fatal if long continued, Mr. Williams hopes to reestablish the tariff as an American political issue.

¶ By ERNST A. GUILLEMIN '24, a book, "Communication Networks," Volume II, John Wiley.

¶ By ROBERT J. ANDERSON '25, a translation from the German of the book, "Metallography of Aluminum and Its Alloys," by V. Fuss.

¶ By F. ROLF MORRAL '32, an article in the October issue of *Metalurgia y Construcción Mecánica*, Barcelona, Spain, entitled "La Ciencia en la Industria." Mr. Morral is a member of the technical committee which edits the magazine.

¶ By JOHN A. BRADSHAW '35, an article, "Motions in Four-Bar Linkages," in *Product Engineering* for August.

DEATHS

¶ WILLIAM C. RICHARDSON '75, prominent Boston architect, October 17. Mr. Richardson was the designer of many school buildings in Greater Boston. He was said to have been the second man in this country to apply the Byzantine Romanesque style of architecture to his designs.

¶ SUMNER W. CHILDS '80, August 14.

¶ NEWBERT M. RANDALL '85, October 15.

¶ LYMAN FARWELL '87, date not known.

¶ JAMES CLARK, JR., '90, October 9. See class notes for account.

¶ ARTHUR G. REED '93, October 31.

¶ JULIAN E. WOODWELL '96, October 23.

¶ ARTHUR E. FREEMAN '05, October 15.

¶ WILLIAM O. TUCK, JR., '05, October 22, as a result of injuries suffered in an automobile accident. Mr. Tuck was sales manager for the chemical division of the Pitts Plate Glass Company, Milwaukee.

¶ WILLIAM C. READ '09, November 6.

¶ ORVILLE W. MESERVE '13, October 11.

¶ PERCY L. FLANSBURG '13, February 2.

¶ STANDISH WESTON '31, October 29.

¶ SAMUEL I. WILKINSON, JR., '34, October 25.

NEWS FROM THE CLUBS AND CLASSES

CLUB NOTES

Montana Society of the M.I.T.

Our genial Dean, Harold E. Lobdell '17, has again visited Montana and, as usual, he came, he saw, he conquered. We all were glad to see him and we took care of him as best we could in a depression-recovering, earthquake-shaken country. He was met at the train in Great Falls at noon on October 23 by Albert E. Wiggin '07, President of the Society and Montana metallurgical manager of the Anaconda Copper Mining Company, and by Earl S. Bardwell '06, superintendent of copper refineries of the Anaconda Company. That evening the above, Ernest C. VanBlarcom '26, and Carl J. Lundborg '22 had dinner at the Meadowlark Country Club. Both VanBlarcom and Lundborg are on the staff of the Anaconda Copper Mining Company at Great Falls.

The meeting dissolved at 11:30, and the next day Wiggin drove the Dean over the new paved highway to Butte, passing through the Helena earthquake area so Lobdell could see the effects of what was probably the most devastating earthquake that ever hit a city so far from the seacoast. The undersigned made a survey of the area, taking in the earth cracks at the north and south ends of the affected area, the distance between the two points being about 35 miles. There were three major shocks and 447 minor shocks in a little over a week. There are two M.I.T. men now working at the East Helena smelter, Stanley M. Lane '35 and Carl P. Stratton '34. This plant sustained a damage of about \$7,000 but was shut down only 19 hours.

Please excuse our taking up so much space with the earthquake news, but about all we hear in this vicinity now is earthquakes and whether the price of copper will go up. Anyhow, Butte was undamaged and the newspaper and radio reports about Helena's damage were, to say the least, exaggerated.

On the 24th at seven P.M., nine of us met to greet Dean Lobdell at the New Finlen Hotel, Butte, and, as usual, we had Montana super grass-fed beef on the menu. Our beef comes from contented steers and that is not "bull."

We heard all about the new doings and wrinkles at Tech since the Dean was here a few years ago, and his talk was most interesting. A number of the Butte Alumni were out of town and could not attend the dinner. W. L. Creden '90 of the State Highway Department sent us a wire of regret from Townsend, as he was tied up there for the night. George Craven '98 was out on a job near Fort Peck. By the way, there are quite a few M.I.T. men at Fort Peck, including T. A. Middlebrooks '30, Lieutenant Robert J.

Fleming, Jr. '31, Arthur B. Marlow '29, Lieutenant John R. Hardin '31, Robert McKenzie '31, George D. Kittredge '17, Robert O. Dehlendorf '24, and Robert L. Morton, Jr., '24.

George H. Holmes, Jr., '24, sent his regrets by proxy, as he is now taking a vacation in Boston, and Stuart Barker '27 is teaching in the evenings, as well as in the daytime.

Mr. Lobdell was the guest of Dr. Francis A. Thomson and Mr. Kemper at the Montana School of Mines, of which Dr. Thomson is President, on the afternoon of the 25th and the writer took him to the Salt Lake train that night.

Those who greeted Dean Lobdell at the Butte dinner were: Albert E. Wiggin '07, Great Falls; F. C. Jaccard '07 and W. R. C. Russert '18 of the Butte staff of the Anaconda Copper Mining Company; William Wraith, Jr., '26, and Tom Graham '35 of the staff of the Anaconda Copper Mining Company at Anaconda; Frederick C. Gilbert '98, Butte metallurgist; William A. Kemper '04 of the Butte Land and Investment Company and Honorary Secretary of the Montana alumni organization; the undersigned, and James E. Davidson of the Montana Power Company, Butte. Mr. Davidson is the father of Jesse I. Davidson '27 who is in Cuba. — CARL J. TRAUERMAN '07, *Secretary*, 25 East Broadway, Butte, Mont.

Technology Club of Rochester

The annual meeting of the Club was held at the home of William W. Vicinus '23, "The Highlands," in Durand Eastman Park, Rochester, on September 28. During the afternoon, many of the members enjoyed a series of sport contests arranged by a committee headed by Henry R. Couch '20. The feature event was a game of soft ball which was won by the Odd Classes, by the slender margin of 17 to 15 runs. Later in the evening, the Technology Bowl was awarded to the Odd Classes for their victory. Annual contests for this trophy are planned. For dinner, Bill Vicinus had prepared delicious broiled chicken and savory steamed clams shipped direct from Boston, which met with the hearty approval of all the 34 members present.

The following new members were elected: Albert A. Hopeman, Jr., '34, Minerva A. Laing '98, Leroy G. Miller '27, Milton Drexler '34, W. Harold Donnelly '23, Richard H. Waite '32, Charles F. Payne '33, Richard S. Morse '33, Richard C. Jackson '30, Arthur B. Fox '33, Ralph M. Evans '28, Robert Cull '34, Richard F. Bailey '35, Charles V. Case, Jr., '33, Cecil Aronson '22, Alexander R. Hamilton '35.

John F. Ancona '03 reported on the activities of the Scholarship Committee. The regular award of \$500 has been di-

vided between two men this year. Additional assistance is being supplied to them by means of the Institute Freshman Competitive Scholarships. It was voted to continue to raise the scholarship fund by voluntary contribution.

The following officers were unanimously elected for 1935-1936: President, Leon L. McGrady '17; First Vice-President, Harold H. Leary '23; Second Vice-President, Howard S. Gardner '30; Secretary, E. Philip Kron '34; Treasurer, Francis B. Thorne '27; Executive Committee, Kendall B. Castle, Jr., '24 (until 1938). The following continue as members of the Executive Committee: Edward S. Farrow '20 (until 1936) and John F. Ancona '03 (until 1937).

It was voted to donate \$50 to the Alumni Athletic Fund in the form of a memorial to Dr. Allan Winter Rowe '01, if the need for such a gift exists.

After a vote of thanks to the retiring officers and committee for their efforts in behalf of the Club during the past year, the meeting was adjourned. — RICHARD M. WILSON '30, *Secretary*, Building 29, Kodak Park, Rochester, N. Y.

Technology Club of Schenectady

The Club met at luncheon at the Y.M.C.A. on Thursday, September 19, in honor of Dr. Dugald C. Jackson, former Head of the Electrical Engineering Department at M.I.T. The meeting was called to order at 12:30 by President Burr S. Weaver '25 with an attendance of 15 members and two guests, in addition to Dr. Jackson. Because of the recent resignation of Leighton R. Rickards '33, who has accepted a position with the New York office of the Bendix Products Corporation, Philip Alger '15 of the nominating committee reported the nomination of Gilbert P. Tarleton '25 for the office of Secretary-Treasurer. The latter was duly elected.

Dr. Jackson gave a short talk, devoted mainly to the background and qualifications of his successor and new Head of the Electrical Engineering Department, Edward L. Moreland '07. Dr. Jackson also made running, informative comments during the showing of the Edgerton high-speed film which he brought with him. The meeting was adjourned at 1:45 P.M. — GILBERT P. TARLETON '25, *Secretary*, Patent Department, General Electric Company, Schenectady, N. Y.

Technology Club of New York

The Club is humming with activity, with many private and class functions in addition to frequent luncheon and evening meetings for members and guests.

On October 17, the Class of 1918 held a dinner under the direction of Major Granville B. Smith. Many members of the Class

were present and spent an enjoyable evening swapping reminiscences and personal adventures. In fact, so successful was the dinner that it was decided to alternate a luncheon and dinner every month at the Club. Those wishing further particulars should get in touch with Major Smith at the Club, 22 East 38th Street.

On October 22, members of the Class of 1933 enjoyed a lively dinner meeting at which more than 20 were present. More details of this affair will be found in the class notes.

The first luncheon meeting of the Club was held on October 23. R. V. Rickord of the Twentieth Century Fund was the guest speaker and spoke on the "Socialization of Medicine." Mr. Rickord is considered an authority on this subject and his talk created wide interest. He traced the developments in socialized medicine in the past few years, describing the various forms it has taken in different parts of the country. Although remaining impartial on his stand toward socialized medicine, Mr. Rickord told his listeners that there is a rapidly increasing public consciousness in respect to medical needs and that the time is coming when the community will have to decide just what form its medical facilities must take.

President Compton was the guest of honor at the luncheon meeting of the Class of 1909 which was held on October 26 at the Club. Further details of this interesting dinner can be found in the class notes.

The annual Contract Bridge Tournament started on October 28. There was a large turnout. As this is written, there are still three more sessions to be played before the winners are adjudged. Suffice it to say that the scores are close and that many "dark horse" teams are represented.

Plans are going forward for the annual reunion dinner to be held sometime next February. The Committee promises the best affair in the history of the Club, eclipsing even the annual dinners of 1928 and 1929. Plans, as yet tentative, indicate that this promise will be fulfilled, and all members are looking forward to the event. — CONSTANTINE S. DADAKIS '34, *Publicity Committee*, 644 Riverside Drive, New York, N. Y.

CLASS NOTES

1873

Referring to the class notes of 1877 in The Review for October, it is stated in a letter from Joseph Gray to the Class Secretary, B. T. Williston, "that without any question, the Class of 1877 was the first one to form a regular organization. This occurred in either December, 1874, or January, 1875." The above statement conflicts with the class records of 1873, from which we quote: "Tuesday, March 13, 1871 — Pursuant to a call for a meeting of the Class of '73, M. I. T., to take action upon the propriety of forming a class organization, a majority of the Class assembled in Room Number 11 at 12M. Mr. F. H. Williams was elected to

the chair. Voted that a committee be chosen to draft a Constitution and to nominate class officers." All this was done and on April 27, 1871, the Constitution as finally written was adopted. The first annual meeting and supper of '73 took place on the evening of May 31, 1871, at the Parker House and each year since to the present time a reunion has been held. — GEORGE M. TOMPSON, *Secretary*, 8 Whittemore Terrace, Wakefield, Mass.

1884

Henry Dexter Bennett died at his home in Brookline on September 5, aged 73. He prepared for Tech at the Brookline High School and Chauncy Hall. He practised his profession of civil engineering for about a year and a half, and gradually worked into the real estate and mortgage business, in which he achieved marked success. He writes in his biography for the Twenty-Fifth Anniversary yearbook: "Shall always regret not having gone to college, because, in my day, there was even less of student life at Technology than there is now, and the brushing up against men, especially in dormitory life and athletic field, is of great value in after life. It seems to me that there is something about scientific study or thought which tends to make people preoccupied and, therefore, not so inclined to sociability."

What he lost by not going to college, he gained in after life, by membership and office holding in the Eastern Yacht Club, Exchange Club, Brookline Country Club, Boston Athletic Association, and other social organizations; he was Class Secretary for several years.

In 1902 he married Suzanne Wheeler Pratt who died some years ago. A daughter, Sarah F., survives him.

The sympathy of the Class goes out to Doane whose son, Henry, died October 19. — A. H. GILL, *Secretary*, 4-053, M. I. T., Cambridge, Mass. S. S. DEARBORN, *Assistant Secretary*, 4 Newport Road, Cambridge, Mass.

1888

Marion Talbot, Emeritus Professor of the University of Chicago, received the honorary degree of Doctor of Laws at the Centennial Celebration of Tulane University, New Orleans, La., in June, 1935.

The Secretary wishes to thank Frank Stetson, of 316 Union Street, Lynn, for sending him a very fine illustration of Walter Shaw's *Andiamo* coming out of Marblehead Harbor under full sail, clipped from the Boston Herald of September 6 with the following notation: "The noted class M sloop, *Andiamo*, owned by Walter K. Shaw of the Eastern Yacht Club, left Marblehead yesterday forenoon with George C. Lauder's bright mahogany 46-Rater, *Windward*, for an informal race down East. The *Andiamo*, known as the 'White Ghost' because of her footing ability in light airs, won the Puritan Cup in 1930."

We all remember the justifiable pride Walter took in winning a majority of the cups from the larger America's Cup de-

fenders in 1930 and we are glad to know that his son and namesake is following in his father's footsteps.

Harry Bigelow's widow recently sold her house on Chestnut Street, Boston. — Mrs. William Snow spent the summer at her summer home in Duxbury and is now at her winter home in Newton Centre, Mass. — Ben Buttolph was prevented from attending the Ned Webster dinner in June by Mrs. Buttolph's falling and crippling her arm. She is improving slowly, but it will be a long process for her fully to recover the complete use of her arm. — C. Leonard Brown has recently removed from 515-14th Street, N. W., to 1316 Euclid Street, N. W., Washington, D. C.

John Faxon, until recently Postmaster of Fitchburg, Mass., writes President Alfred Sawyer in his inimitable style and his letter is so much to the point that we pass it on to you *in toto* and without expurgation: "The letter from our transportation member, Brooklyn Rapid Transit Collins, regarding the reunion at Ned Webster's on Saturday is here but finds me tied up with a long-standing commitment to participate in some things the others call 'events,' so I must needs solace my regrets by asking you to say to the fellows how sorry I am that even M.I.T. science has not yet made it possible for a man to be in two places at once. Proffer my sincerest greetings and good wishes.

"May our really dear, dear friend, the inexorable Father Time, be lenient to us 'remainders' and let this present number of '88 men be on hand to report for the 50th anniversary in 1938. Even the now superbly repudiated New Deal and the worse than Russian alphabetical combinations cannot be interfered with by the 'roving commission' of a brain truster who is not really to be trusted. I offer this toast: The Constitution of the United States — long may it wave."

Your Secretary's youngest daughter, Sallie, was married to James Robb Hughes, Jr., of Utica, N. Y., on October 5 in the Methodist Episcopal Church, Chebeague Island, Maine, where her grandfather preached 50 years ago when her father was a freshman at Technology in 1885. After a wedding trip through Canada, they are to live in Utica. Thirty Newton Centre and Cambridge friends made the trip to the Island for the occasion. After his 21st summer on Chebeague Island, starting each day with a dip in the ocean before breakfast, 18 holes of golf before dinner, with a sail in the afternoon, and acting as manager of the Golf Club movie show each Friday night, your Secretary returned on November 1 to his Cambridge home for the winter. — BERTRAND R. T. COLLINS, *Secretary*, 52 Garden Street, Cambridge, Mass.

1890

Notice has been received of the death on October 19 of James Clark, Jr., at his home in Louisville, Ky. He had been in failing health for some time. Mr. Clark started his career in the electrical industry in 1890. For two years after he was

1890 Continued

graduated, he worked for the Ohio Valley Telephone Company. Then he formed the partnership of Cooper and Clark, said to be the first electrical supply firm in the South. Several years later the company was reorganized under the name of James Clark, Jr., Electric Company.

Mr. Clark was a director in the old First National Bank, which his father helped organize, and was a charter member and Vice-President of the Rotary Club. He was chairman and a director of the Transportation Committee of the Louisville Board of Trade, a member of the American Institute of Electrical Engineers, the Electric Club of Louisville, the Engineers and Architects Club, the Louisville Lodge of Elks, the Pendennis Club, and the Huguenot Society of South Carolina. His wife and two sons survive.

On the last week-end in September, Harry Burley and his wife had Kendall and Sherman with their wives at his farm in Epping, N. H. They reported a fine time and a fine old place—in the family for several generations.—de Lancey spent the summer at Blue Hill, Maine.—Goodwin reports seeing George Hale in Pasadena this summer, with a little less pep than he had in the old days in the physics lab.—Voorhees dropped in the office late in September, uncertain whether he would return to Chicago for the winter or remain in the East.—Billy Ripley has moved from Cambridge to 38 Bracebridge Road, Newton Centre. We are all sorry to hear that he has not entirely recovered from his accident in the taxi several years ago.—GEORGE L. GILMORE, *Secretary*, 57 Hancock Street, Lexington, Mass. GEORGE A. PACKARD, *Assistant Secretary*, 50 Congress Street, Boston, Mass.

1892

Joshua Atwood is chairman and C. E. Fuller is a member of a committee of nine named last month by Mayor Mansfield of Boston to study the city's requirements in respect to snow removal. The snowfall was unusually heavy last winter and its removal was a big problem, which was solved only slowly and mostly by the sun.

Billy Kales and Harry Carlson, members of the Corporation, attended its autumn meeting at M.I.T., October 9.—Arthur W. Dean, long connected with the Massachusetts Department of Public Works as chief engineer, left that employment to become chief engineer of the Massachusetts Planning Board, newly created by the Legislature in 1935.

A. L. Goetzmann writes on the letterhead of Puffer-Hubbard Manufacturing Company, Minneapolis, Minn., as follows: "I am very happy to report to you that I am well, happy, and moderately prosperous, and should be glad to be remembered to any of the members of the Class you may meet. I have just returned from a 30-day motor trip through the East, during which time we spent a night with Sam Heywood of Worcester whom we found in, as nearly as it is possible to express it, the same condition as I have stated above in respect to myself."—Heywood gives confirmation as follows:

"I had a very fine visit from Goetzmann and his wife. We spent most of the time talking over old times and old friends."

E. C. Hall's letterhead reads: "Real Estate Management, Also The Central Garage, Watertown, Mass." He writes as follows: "There is nothing remarkable in what I am doing except, perhaps, that I have not as yet lost my courage of better times. As you probably know, my business is looking after a quite numerous tenancy of real estate which I own, and that keeps me busy. Just now I am buying a house nearby and building another for investment. I have built in the past four years a summer home at Lanesville, Gloucester, and spend my time there part of each week on an informal garden which I expect, in another year, will be quite a show place. I have some interest in politics here; am on the Finance Committee of the Town, and have served as Water Commissioner. Fred Fitz of our town and of our Class lives near and I see him often. He still holds his long-time job on the Metropolitan Park Commission."

Hutchinson visited oil wells and fields in Texas in August, spending about ten days in and about Houston and seeing some of the wells in newly discovered fields, where it is the usual thing to drill a well 7,000 feet deep in 25 days. The petroleum industry is perplexed by state regulations and proration, but drilling and production go on.—Who among the members of the Class knows William Braden? He was at Tech only during the freshman year, but since then has distinguished himself in acquiring and developing the Braden Mine in Chile, the mine being now one of the successful Kennicott units. Braden appears in the new Register as general manager, Anaconda Copper Company, Santiago, Chile.—Hutchinson ran across Scott Parrish and Mrs. Parrish, a surprise meeting, on the beach at Duxbury, Mass., on a Sunday afternoon in September.

W. H. Lane and Son, Inc., Iron and Steel Scrap and Rails, is the letterhead on which W. H. Lane writes from Portland, Maine, as follows: "Many times I have intended looking you up when in Boston, but something has always seemed to intervene. Will try to see you the next time I am in Boston." I hope Lane will look us up inasmuch as I do not recall seeing him since we were graduated.

W. W. Locke, for 37 years in the employ of the Massachusetts Metropolitan District Commission, as sanitary engineer, retires at the end of this year. He writes as follows: "Mrs. Locke and I are planning to leave as soon thereafter as possible, probably by January 15, for California via the Panama Canal. I am returning to my birthplace, where I expect to be very busy for several months in settling my mother's estate. Plans beyond that are now nebulous, but I expect Framingham will see me again next fall."

George H. May of Lancaster, Mass., gives a brief review of his doings as follows: "After graduating from Tech I went to the Solvay Works at Syracuse,

where I juggled chemicals for four years. The year 1897 I spent as chemist and works superintendent with Billings, Clapp and Company. In 1898 I went with the American Pegamoid Company of New York. This venture was a financial failure, but my partner, John Aspinwall, and I took over the Pegamoid ruins, formed the Fabrikoid Company, and made a success of the business, which was the manufacture of imitation leather. In 1910 we sold out to the du Pont Company and my business since that time has been playing golf and trying to make a farm at Lancaster pay expenses."

Ralph H. Sweetser is employed as Secretary of the Membership Committee of the American Institute of Mining and Metallurgical Engineers with headquarters in New York at 29 West 39th Street.

Ross F. Tucker, Professor in Charge of the Course in Building Engineering and Construction, has been on the staff since 1926. He initiated instruction in this field which has attracted many students, graduating an average of 15 in each class. He writes about his recent cruise to Mexico as follows: "Wife and I had such a good time this summer that I must tell you about it in case any of our over-worked classmates are in need of a rest cure. We went on a cruise on the S.S. *Granada* of the Standard Fruit Company to Frontera, Mexico, for a load of bananas, and if you will believe it, we did not see a wave higher than my desk from the time we left until we got back. It was a run of 3,400 miles, down the Atlantic, through the Straits of Florida, and across the Gulf of Mexico, taking 13 days, down and back, and we missed the Florida hurricane, that put the *Dixie* ashore, by only 48 hours."

"Frontera is a little primitive Mexican village just under the shoulder of Yucatán, in the State of Tabasco. It is up river from the Gulf two or three miles and consists of a blue and white customhouse, on the wharf, a few other substantial buildings used mostly for stores, and a native village of wooden one-story, one-room houses, with palm-leaf, thatched, conical roofs. When we came up to the dock, most of the male inhabitants were assembled there, nearly all of them dressed in blue denim overalls of various shades, depending on the number of trips they had made to the washtub, which they evidently had done frequently, and a scattering of men clad in white ducks, whom I later learned were officials and, as I suspect, the governing class, for while Tabasco is supposed to be a real socialistic state, my impression is that the people are exploited as much as they ever were. Certainly they gave no evidence of being overjoyed at their new freedom, for, this was my second visit to Frontera, during neither trip did I see anyone smile, much less laugh, or give any other evidence that life was particularly enjoyable."

"They have pulled down the churches and are using the materials to build schoolhouses. We were invited to inspect the jail, which was wide open; prohibition is rigidly enforced, which possibly accounts for the smilelessness,

1892 Continued

and sanitation regulations are very strict. Although I am told that Mexicans are a dirty people, Frontera was as clean as clean, for I did not see a rubbish heap or an empty can, nor did I encounter an unpleasant odor in the entire town. I saw but one sign printed in English and that was attached to a tree close to the post office and was addressed to the 'ladies,' informing them that 'Smoking is not correct.' Incidentally, women were conspicuous by their absence and few of them were to be seen.

"We stayed all day in Frontera and about five in the afternoon went up river about 40 miles and anchored. We took along about a hundred of the blue-denim people and about a dozen white-duck chaps, each one of whom was surrounded by a belt of cartridges and a gun. Later on I asked one of them, what was the idea of the gun, and he replied: 'Oh, just to keep them calm.' As soon as we had anchored, a fleet of small launches came down from up river towing barges of green bananas, and presently the ship was completely surrounded by them. Where they expected to put all of those bananas was beyond me, but before morning they had loaded all of them, and brought down as many more, which they also put aboard. Tally men stand at every loading port and count not only every bunch but the 'fingers' in every bunch. Our total was 39,000 bunches. At two of the ports were loading machines but I could not see that they handled many more bananas than the men at the other ports or that they displaced more than four or six men.

"And speaking of the men, there were nearly a hundred of them loading bananas, but there was not a sound out of them, and time and again I had to look over the side to see if anything was going on. They didn't talk or sing or shout or make any noise at all, and if calmness was the proper deportment, they met all requirements. I was told that the wage was 35¢ an hour, but that the company did not pay the men directly. It paid the Union, which used the money not only to pay the men who worked, but those for whom there was no work and thus the unemployment problem was solved. I wondered if those white-duck chaps were the Union but, anyway, the smilelessness and the guns and the silence in which the men worked didn't seem to click, but then again, it may have been the nature of the beasts. I was not there long enough really to know; perhaps it is a perfect socialist state. I might prolong this to tell you about the dolphins and the flying fish and the whales — 12 — count 'em — 12, which contributed to the entertainment of our 35 passengers, but I will desist, although if anyone wants a good rest, good food, and an enjoyable cruise at low cost, I can commend the Standard Fruit Company for completely fulfilling these specifications.

"Incidentally, you may be interested to know that I have been appointed a member of the Housing Committee by the United States Chamber of Commerce, so I may get a chance to promulgate some

of the ideas on the housing problem that I have been shouting about so much during the last few years."

We have just heard and record with regret the death of our classmate, Prescott A. Hopkins, at his home in Newton, May 29, in his 64th year. He is survived by his wife, Lucie A., a son Prescott A., Jr., and a daughter, Lucie.

He received M.I.T. degrees in Architecture, S.B. in 1892 and S.M. in 1893, and carried on another year studying design under Professor Désiré Despradelle who had just joined the Institute staff. The next year, 1895, Hopkins became Assistant Professor in Architecture at Drexel Institute, Philadelphia, which post he held for ten years; next he practiced his profession in Philadelphia for four years, and then spent a year at Georgia School of Technology, Atlanta, establishing the chair of Architecture.

Returning to Boston in 1905, the remaining 30 years were spent in the active practice of architecture, designing and building many structures, notably the First Church of Christ Scientist at Sharon and numerous Telephone Company buildings, among which are examples at Martha's Vineyard and Nantucket designed to fit into the character of those towns.

Hopkins was known to his friends as a quiet, scholarly, home-loving man with his heart in his work, and to his associates, for the highest standard in his profession. — JOHN W. HALL, *Secretary*, 8 Hillside Street, Roxbury, Mass. W. SPENCER HUTCHINSON, *Acting Secretary*, Room 8-219, M.I.T., Cambridge, Mass.

1895

There is unquestionably a gain in business recovery. Your Secretary is convinced of this because it has become more difficult recently to obtain replies to inquiries concerning class member activities. — The photograph of the Class, taken at the Fortieth Reunion last June, has been mailed to those who attended, and much favorable comment has been heard from some of the recipients. There are a few, however, who possibly may have mislaid their mail, and, of course, they could be excused for this delay.

Professor Harold K. Barrows, Professor of hydraulics at the Institute, was named a director of the New England Water Works Association at their convention in Providence, R. I., September 20. — Gerard Swope, Chairman of the 1935 Mobilization for Human Needs, which is making a drive for funds to support private welfare organizations in the United States, is contributing a wonderful service to the stricken humanity of our country. Gerry deserves the greatest commendation for his breadth of vision and conception of the necessity for prompt action under most trying circumstances. — Mr. and Mrs. Thomas B. Booth left Boston on the S.S. *Samaria*, August 10, for a short trip to Europe, and returned, September 13, via Montreal. They motored for a week in western and southern England, spent some time in and about London, and took a brief trip to Paris and back by airplane.

Alfred L. Dejonge is now living at 45 Prospect Place, New York City. George A. Nichols has moved to Washington, D. C., and is living at 1401-44th Street. Professor Charles M. Gay's address is Righters Mill Road, Narberth, Pa. — Professor C. W. Berry has contributed with others to the publication of a book entitled, 'Problems in Engineering, Thermodynamics and Heat Engineering,' now on sale in the United States and London. — This issue reaches you in December and brings with it best wishes for a Merry Christmas and a Happy New Year. — LUTHER K. YODER, *Secretary*, 69 Pleasant Street, Ayer, Mass. JOHN H. GARDINER, *Assistant Secretary*, Graybar Electric Company, 420 Lexington Avenue, New York, N. Y.

1896

The headline this month to be read carefully by every classmate and acted upon promptly is that our Fortieth Anniversary is due next year and will be fittingly celebrated at East Bay Lodge, Osterville, Mass., from Thursday, June 4, to Sunday, June 7, inclusive. This has almost become like home to us after having been in the care of host Brown at East Bay Lodge in 1931 and in 1926. The first announcement of this affair will be circulated by mail to all members of the Class, perhaps before this item actually appears in print, but the point is that everyone should mark the date on his calendar and plan to be present. There is an added incentive for this Fortieth Anniversary in that under the new plan for Technology reunions there is an annual Alumni Day, which was inaugurated last June, and next June this Alumni Day is scheduled for Monday, June 8, so that the Class of '96 can celebrate at Osterville up to Sunday night or Monday morning and then come to Boston for Alumni Day on the Technology grounds in Cambridge, culminating in the Alumni Dinner in the evening.

On October 11 Con and Mrs. Young called upon the Secretary. They had closed their house at Bass River and were on their way by motor to their summer home at Fort Myers, Fla., stopping in Boston over the week-end and making stops in Wilmington and other places en route. Con reported that they had had a very good summer, that his rheumatism bothered him only occasionally, and that life was still bright. Both he and Mrs. Young were looking very well.

An item interesting to the Secretary was supplied by the Clipping Bureau. This item reported that Professor Charles E. Locke of Brookline had been reelected Vice-President of the Locke Family Association at their 45th annual meeting in the Town Hall at Rye, N. H., on August 28, and at that meeting Professor Locke, jointly with his mother, presented a bronze tablet commemorating the death of Captain John Locke, who was killed by the Indians, August 26, 1696, at Locke's Neck in Rye. Captain John was the progenitor of the New Hampshire branch of the Lockes in New England.

1896 Continued

Charles William Tucker and Miss Bertha May Smith announced their marriage on Saturday, October 5, at Lawrence, Mass. The couple will be at home after November 1, at 144 Mill Road, North Andover.

Various clippings have been received regarding the trip that Paul Litchfield made around the world, visiting all of the varied operations of the Goodyear Company. It is interesting that the *Daily News* of Colombo, in Ceylon, gave Paul the title of "Tyre Master." Paul himself felt that one of the high spots of his trip was the reception and tea given to him by the M.I.T. Alumni in Singapore. The Alumni there numbered three, and they invited a great many of the men and women residents of Singapore who were graduates of various American colleges, including many Chinese young ladies. It was a most interesting and entertaining afternoon. At Honolulu, Paul appeared in print with a cut showing him decorated with the characteristic native wreaths or *leis*. It seems strange that although Paul had crossed the Atlantic 32 times, this was his first trip on the Pacific. It was in Honolulu that he lost Mrs. Litchfield, who returned to the Coast, while he continued the rest of his journey alone. Since Paul's itinerary was given previously in class notes, it will not be repeated here, beyond saying that he carried out his original plan. One job which Paul had was to open officially the new Goodyear tire factory in Java in the typical manner, by pressing a button. This was a day of big doings and a big dinner attended by everyone of prominence. Paul can consider himself to be officially engaged to give an account of his trip at the class dinner scheduled for Saturday night, June 6, 1936, as a part of our reunion program.

Jacobs up in Vermont says he has been so busy since returning from his trip around the world that he has been unable to find time to make any real report of it, but promises that it will be forthcoming all in due time and agrees that it will rival Fuller's. Some idea of Jacobs' condition may be obtained from his statement that with all his State work, seismograph, museum work, and teaching, he has not even had time to play a game of golf.

Ed Northrup down in Pensacola, Fla., has had some recent correspondence with the Secretary and has again given assurance that he is going to be at our reunion next June.

Jim Melliush in New York likewise insists that he will make the Fortieth Anniversary at Osterville, even if he has to walk all the way from New York to Boston. However, Jim is doing very well in New York City and reports that his little daughter has secured a scholarship at the Horace Mann School, Columbia University, and has started there this fall.

Walter Pennell spent last summer in Exeter, N. H., his old home town. He now owns a home at 69 Court Street, and spends his vacations there. He will welcome calls from any classmates during the summer period when he vacations from his telephone duties in St. Louis.

Our classmate, Ed Barker, or perhaps we should say more properly Edgar H. Barker, Professor of Chemistry, Lowell Textile Institute, in Lowell, Mass., has been a prime mover during the past three years in the revolutionary development for the removal of grease and other impurities in raw wool through a freezing process. An article by Barker appeared in *The Textile World* in May, 1935, under the title, "Frosted Wool," which is the name given to this new process. Barker reports that a commercial unit has been installed during the past year with a capacity of from 1,000 to 1,500 pounds of grease wool per hour. This plant has already treated experimentally about half a million pounds of wool, showing results better than those obtained by the regulation methods of wool cleaning.

Gurney Callan has arrived in the grandfather class. It will be remembered that his daughter, Priscilla, married Mr. Houle, with the result that on September 10, Jacqueline Renee Houle arrived, and she has the following specifications: lots of dark hair, five pounds, 14½ ounces, eyes turning brown, and she is the idol of her grandparents.

Arthur Baldwin writes from Paris that he was again appointed by the Secretary of Labor to attend the annual conference of the International Labor Office at Geneva last June, but, much to his relief, he did not have to be so much in the limelight as in the year previous, and did not have to worry about any speech. However, it has been a considerable source of satisfaction to Arthur that he did have the opportunity to talk the previous year, and the talk was delivered from the same desk at which have spoken all of the celebrities of the League of Nations affairs, such as Briand, Stresemann, Laval, Eden, and others. In the August, 1935, issue of *Franco-American Trade*, there were three articles by Arthur. One gave his impressions of the eighth biennial Congress of the International Chamber of Commerce which met in Paris in June. Arthur, as President of the American Chamber of Commerce in France, had an important part in this Congress. The second article was written in French, in which language Arthur has now apparently become quite an expert. It set forth some viewpoints on the problem of Franco-American trade relations. The third article summarized the oration made by Arthur at the Independence Day banquet of the American Chamber of Commerce in France. The substance of his talk was on the closer relationship between France and the United States.

The Fullers have reported their arrival in Japan. It took them 13 days to make a 10,000-mile trip across Asia by way of Siberia. Train accommodations are now satisfactory, and much improved over what they were a few years ago when one had to carry food for the entire trip and be prepared with extra covers for sleeping. The scenery is interesting but not spectacular. The first part of the trip is through the wheat plains and low hills of Russia. After crossing the Urals, which are somewhat disappointing as to scen-

ery, consisting mainly of round wooded hills of medium height, they came into Siberia, which is now a district under active cultivation, with cities and fine buildings springing up everywhere. It is a great wheat district. The scenic climax in Siberia came at Lake Baikal which is surrounded by mountains. The railroad runs for nearly 200 miles around the edge of the lake through many tunnels. Beyond Lake Baikal the country was hilly for a day and a half, much like the Berkshires of Massachusetts. The Fullers crossed the border into Manchukuo and went across endless grass plains to Harbin. The service was excellent and cheap on this part of the railroad. From Harbin they traveled to Mukden and South Manchuria and then changed trains at Antung on the Korean border. They traveled the length of Korea, stopping a day at the old capital of Seoul, now known as Keijo, then ferried across the Straits of Shimoda and traveled by train without stop to Yokohama, where they arrived about the end of September, and from which point they planned to come home, making a few stops *en route*.

Just after these notes were finished the sad news was received of the death of J. E. Woodwell in New York on October 23. He had not been in good health for sometime. A more detailed story will appear in the next issue. — CHARLES E. LOCKE, *Secretary*, Room 8-109, M.I.T., Cambridge, Mass. JOHN A. ROCKWELL, *Assistant Secretary*, 24 Garden Street, Cambridge, Mass.

1898

This summer your Secretary and Mrs. Blanchard spent two months in California attending the convention of the American Chemical Society at San Francisco, visiting their son, Malcolm, who is studying at the College of the Pacific at Stockton, and generally touring that state, Oregon, and Nevada.

We spent a delightful Sunday with Frank Coombs and Mrs. Coombs. On our drive about San Francisco and vicinity we saw many square miles of red, green, and other colored tile roofs, tiles having been designed and supplied by Frank himself. The building industry in San Francisco is not booming and the tile-roof business is very dull. Nevertheless, Frank is his own cheerful self. He recalled incidents of our student days; in particular did he mention an incident in which Harry Tyler had helped him through difficulties, and he spoke in such a kindly way of Dr. Tyler that we thought to mention it to the latter when we saw him in September. Dr. Tyler remembered the incident, remembered Frank, and was most obviously pleased. Ninety-Eight's ranks embrace a great many teachers, and I guess they all feel gratified when former students show evidence of appreciation.

For a number of years Bill Perley was one of the loyal Tech men in San Francisco and we heard many inquiries about him and expressions of esteem.

Going south, we went out to Paul Johnson's place at Altadena, but, as was to be expected in August, he was at the

1898 Continued

beach. Nevertheless, we enjoyed seeing his place, which is right up at the base of Mount Lowe and overlooks a deep arroyo. Paul was up in Alaskan waters in his yacht, *Seyden II*, early in the summer, but returned to Seattle about August 1 to charter the yacht. Just about now, October 25, he is in Portland, Ore., to meet the yacht, he plans to run it himself and take paying guests so as to have more time in Alaska himself.

The Boston *Sunday Herald* rotogravure section of October 13 carried a strip of photograph of Roger Babson from childhood to student entering Tech, to his present maturity, under the caption: "Through the Years with Eminent Bostonians." Everywhere on the Pacific Coast we found Babson held in very high esteem. A rather amusing incident occurred on the Santa Fe observation car crossing the Mohave desert. We had the car almost to ourselves and got chummy with the conductor, William P. Underwood, who claimed to be a cousin of our own classmate, William Lyman Underwood. This gentleman is a philosopher and an amateur student of finance and economics and has a perfect plan to cure all of our social ills through remonetization of silver. He has corresponded with President Roosevelt and eminent bankers who have accorded his ideas great acclaim and, to cap the climax, he had even written to that great authority, Roger Babson, who had strongly endorsed his plans. In the Boston *Herald* of September 12 we noted a short column of advice from Babson entitled: "Buy or Build Now." We quote one sentence: "President Roosevelt's promised 'breathing spell' is like the act of a man whose supply of liquor has been entirely exhausted and who then proceeds to take the pledge."

Charley Hurter took a Mediterranean cruise last winter and on returning spent the summer at East Orleans on Cape Cod. He is just returning to Wilmington, Del., where he apparently intends to spend the winter. — Frederick C. Gilbert is consulting engineer for the Alameda Mines, Inc., developing a gold-silver property near Virginia City, Mont. — ARTHUR A. BLANCHARD, *Secretary*, Room 4-160, M.I.T., Cambridge, Mass.

1899

Because some of you heeded my recent broadcast, I have a modicum of news for the column. Albert Nathan writes from Plainfield, N. J., where he has opened an office, that he likes living there and working there a lot better than in New York. He doesn't have to commute, and he doesn't have to pay a lot of New York State taxes, and he can raise German shepherd dogs for recreation. He has only four just now and is lonesome because once he had 16.

Haven Sawyer writes from Bangor, Maine, that things are definitely on the upgrade there — and that is truly good news. From time to time I hear of W. S. Newell, President of the Bath Iron

Works, Bath, Maine. He is helping the Government bring the Navy up to treaty strength. Another Maine resident, Edwin Sutermeister, has been accorded recognition by the Technical Association of the Pulp and Paper Industry through its award to him of the Association's 1935 medal. Sutermeister has published two books, namely: "Chemistry of Pulp and Paper Making," now in its second edition, and "Casein and Its Industrial Applications."

Ben Hinckley wrote of his pleasure in attending the reunion in June, and said he thought he would spend the winter in Newton this year rather than go to Florida, as in the recent past. — W. E. Parker, of Kensington, Md., writes that though he retired from Uncle Sam's service to rest, he still finds himself extremely busy, particularly with civic affairs. They have proved interesting, but perplexing, and Parker feels that things have reached the pass they have because there are not enough "idle" fellows like himself to take an interest in things civic and things political.

Arthur Hamilton dropped me a note from Sugar Hill, N. H. He says they are getting ready for snow. George Jackson was kind enough to reply to my broadcast. Lawrence Addicks, of Bel Air, Md., sent me an article of his which I have not yet had time to read, but which I may review in this column when I do. D. C. Churchill of the Churchill Weavers, Berea, Ky., is somewhere in the East at this moment, and possibly will find his way to Washington on his return to Berea.

The treasury is out of the red. — W. MALCOLM CORSE, *Secretary*, 810 18th Street, Washington, D. C. ARTHUR H. BROWN, *Assistant Secretary*, 53 State Street, Boston, Mass.

1901

Frank D. Rash is now located in Louisville, Ky., where he is a consulting mining engineer. He writes: "After almost four years in emergency recovery work, as manager of the Louisville Agency, Reconstruction Finance Corporation, and President of the Federal Land Bank of Louisville (serving the states of Ohio, Indiana, Kentucky, and Tennessee) I retired from the latter position on May 15 for a period of rest and relaxation. With Mrs. Rash I spent most of the summer in Europe, visiting England, Scotland, France, Switzerland, Germany, Holland, and Belgium. At Brussels attended F.I.D.A.C. Congress (*Fédération Interallée des Anciens Combattants*) representing the American Legion; also witnessed the funeral of Queen Astrid. In Paris was gratified to see an M.I.T. man, Bosworth '89, presiding over the destinies of the University Club. America and 'the two' young granddaughters still held sufficient charm upon my return from foreign shores."

Since writing the class notes for the November Review, I have received one of our "data sheets for class news" from Anna B. Gallup in which she says: "I have been cooking up a project for a new

Children's Museum. We tried to get \$968,000 from PWA funds for the building. We have met with difficulties, owing to the reallocation of PWA funds which diverted some of the money we hoped to get from PWA to WPA projects. I am sending you a picture of what we asked for and some typed information about the Museum. It was in two rooms when I came here in 1902; now it has outgrown two buildings." The plans Miss Gallup sent me show a very attractive building for a museum, and here is hoping she secures the funds she needs for its erection!

Philip Wyatt Moore is Vice-President of Poor and Company of Chicago. He is also one of the valued "sustaining members" of our Class. — H. P. Parrock writes from California: "I moved to San Francisco a year ago last October. I have seen Marcus once or twice, and have attended one or two alumni luncheons. Phil Moore paid a flying visit here in June — stayed a day and was gone again."

My namesake, L. E. Williams, writing from Detroit, where he is plant manager of the Ray Sand and Gravel Company, says: "From your address you must live a life of ups and downs." As usual he is right! — ROBERT L. WILLIAMS, *Secretary*, 109 Waban Hill Road North, Chestnut Hill, Mass.

1904

The 1904 class notes for this issue are decidedly at a premium; in fact, the sole offering which I have for your information and edification is the following article taken from the September, 1935, issue of *Photography*, a magazine published in London, England. This article gives the English reaction to Technicolor:

"As sound killed the silent films, so will colour, say filmland's experts, sound the swan song of black and white. Learning from the cinema, commercial photography, too, will veer away from monochrome.

"The revolutionary is Dr. Herbert Kalmus, one-time instructor at M.I.T., head of the Technicolour Corporation, and now negotiating for a British Technicolour Company. Tall, lean, with something of the professional bearing about him, Dr. Kalmus told *Photography* of the development of a process which has set the film critics of two continents talking.

"So much has happened since that he almost forgets his position at the Institute. 'I'm not sure whether I was an instructor or a professor,' he says. But while there, he controlled research work. Developed several inventions which have since become famous. One was Technicolour — but not known as that in those days. It wasn't just an offchance discovery. 'I never chanced upon anything worth while in my life,' says the Doctor. 'We find a problem of significance to industry, and we tackle it as scientifically as we know how.' So Technicolour was no lucky accident.

"First patent appeared in 1919, and following usual procedure — 'our custom,' explains Dr. Kalmus, 'was to set up

1904 Continued

every job as a separate entity.' — Technicolour Company came into existence. Followed sensational productions — 'King of Jazz' and 'Whoopee.' Early days, they were, when Technicolour was only partially developed. The spectrum was merely split into two so that colours at each end did not get sufficient light. On went research work and then the world saw a new Technicolour in Walt Disney's Silly Symphonies a year ago. Appetites were whetted. Here, for the first time, was a process which split the spectrum evenly among the three primary colours, red, green, and yellow, black as fourth colour, giving full tone values. Came 'Becky Sharp,' first full-length feature film in the new Technicolour. And then we knew for certain. Real cine colour at last!

"Any other really successful process; any competitor to face? Answers Dr. Kalmus: 'I never stop hearing about colour processes. There must be thousands of them. But there's not one yet which has produced 30 or 40 full-length productions on a commercial scale as has Technicolour.' Where most other systems have failed is in their need for special gadgets.

"The one thing that has killed more colour systems than anything else," Dr. Kalmus maintains, 'is that they have depended on some special apparatus in the theatre — special screens or viewers.' There's nothing like that about Technicolour. It's a straight job of colour photography to you, if not to the technician.

"In the film studio, of course, must be a special camera — and an expert eye. The eye belongs to Mrs. Natalie Kalmus, who looks after colour direction, knows all the 'tricks of the trade.' 'You have to learn how one range of colours will kill another,' she says. A bright colour can kill a pastel shade. Which can be both a nuisance and a godsend. An assistant once, treating a Metro-Goldwyn swan ballet scene, was told to use shell-pink for the swan, so that it would project as white. But he used the wrong pink, and the unfortunate swan swam round looking a lovely apple-blossom shade. 'Well, there was only one thing to be done,' said Mrs. Kalmus. 'I put a border of vivid red roses round the pool and killed the pink.' Made the swan live!

"Next development on which Technicolour experts are working is to get all three primary colours on to one strip of film instead of on three, as formerly. Mrs. Kalmus gives two years as a likely period for the perfection of this new device."

As I have no more notes to publish at this time, I will close by wishing you all a Merry Christmas and a Happy New Year. — HENRY W. STEVENS, *Secretary*, 12 Garrison Street, Chestnut Hill, Mass. AMASA M. HOLCOMBE, *Assistant Secretary*, 8 Rosemary Street, Chevy Chase, Md.

1905

The 30-Year Reunion Booklet is out and has taken its bow. In it the Committee attempted to register some of the

enthusiasm of the Reunion and to show by pictures, incidents, and so on, that the spirit of '05 still flourishes as it did 30 years ago. Better make the next one if it takes a leg or costs a job. The Class Statistician has deduced that 11 men from New York attended the Reunion, three from Connecticut, three from south of Philadelphia, five from west of New York, one from England, and 24 from Boston and north — a pretty good proof that Old Lyme was (and is) a good place for the get-together. A resolution testifying the great loss felt by the Class in the loss of Bob Lord, who died July 29, 1934, was adopted and sent to his widow with the sympathy of all his classmates. Your Secretary has a reply from Mrs. Lord indicating in turn her affection for the Class.

The Bell Laboratories *Record* of September, 1935, contains this appreciation of Thomas Shaw, VI: "In any history of the art of loading telephone circuits as practiced in the United States, the part played by Thomas Shaw, who completed 30 years of service on July 10, will inevitably receive important consideration. He joined the Bell System soon after the first commercial application of loading — the introduction of inductance coils into telephone circuits at periodic intervals to reduce the attenuation. Since then he has been intimately concerned with the theory, development, and application of loading coils. Notable among his contributions in this field have been fundamental work on phantom-loading problems and development of loading coils for submarine cables and of loading systems for incidental cables in open-wire carrier circuits. As an expert on coils with magnetizable cores, he has also much to do with various other types of magnetic coils used in communication circuits.

"In recent years Mr. Shaw's work has been more particularly directed to the economic phases of loading-coil development involving smaller and less expensive units and on the reduction of cross-talk in circuits, the latter being a problem that has been greatly intensified by the use of long, repeatered, quadded circuits. His technical paper, 'Development and Application of Loading for Telephone Circuits,' presented before the American Institute of Electrical Engineers in 1926, in which he was co-author with William Fondiller, has been for years the definitive treatise on this subject of loading.

"Mr. Shaw joined the engineering department of the American Telephone and Telegraph Company in Boston in 1905, coming to New York with that department at the time of the 1907 consolidation. He received his education at the M.I.T., where he was given the degree of S.B. in 1905. In 1919, when the department of development and research was formed, he became associated with its transmission-development group and has remained with the transmission development department since the consolidation of the department of development and research with the Laboratories in 1934."

Our Baltimore correspondent, pressed for local '05 news, writes about W. H.

Blakeman, XIII: "For a number of years after Blakeman was graduated, he was in the shipbuilding business, but sometime in the early Twenties his company folded up. He then turned to insurance business, and was in that for a number of years. Last fall a Republican governor was elected in this state. Blakeman is a Republican, and somewhat of a politician, and shortly after that he was handed the position of State Budget Director. This position calls for a man of certain capabilities and very high integrity, and Blakeman is considered an excellent man for this work. From all I can understand he is handling himself and the position in an exceptionally fine manner, and I hear only the highest praises of the way he is doing the work."

Elmer W. Wiggins, V, proprietor of E. W. Wiggins Airways, Maine, Providence, R.I., writes that on account of some heart ailment, he has been ordered to take two months of absolute rest. He is now on a boat trip to the Coast and return. Here's hoping it will put him back on his feet again. — Reginald Fitz, M.D., V, Associate Professor of Medicine at the Harvard Medical School, has been appointed University Marshal. The Marshal has charge of the Commencement exercises at Harvard. Another '05 boy makes good at Harvard! — Warren W. Loomis, VI, has resigned as purchasing agent of the city of Boston and accepted a similar position at the Christian Science Publishing House in Boston. A jump from politics to science (or religion) sounds logical for Bunny.

Charlie Mayer, IV, has changed his address from Municipal Building to 9519 Shore Road, Brooklyn. Apparently he has moved City Hall to his home. He writes that he's down near the jumping off place "with a fine view of Quarantine and passing ocean liners." — Bill Motter spent his vacation this summer "in a Catskill trout stream." Hope it was as fishy as it sounds. I saw Fred Pirie on the street in Boston recently. He has left the J. T. Wilson Company, with whom he has been associated since graduation, and started in on his own (general contracting). Says things are going great, "considering."

Arthur E. Freeman, II, died at his home in Arlington, Mass., on October 15. He had been doing consulting engineering in Boston during recent years.

Changes of address since the last issue: Frederick P. Poole, VI, Lykens Hotel, Lykens, Pa.; Ben E. Lindsly, III, care of J. H. Fredrickson, 618 West 15th Street, Oklahoma City, Okla.; Frank S. Elliott, III, 7200 Colgate Avenue, University City, St. Louis, Mo. Although the Secretary has written them asking for data as to new business connections, answers are apparently delayed to help fill the next issue. Remember, fellows, it's harder for a new man to get newsy items from a class of 400 scattered all over the world, so help by writing of yourself and classmates you meet or hear from. — FRED W. GOLDTHWAIT, *Secretary*, 175 High Street, Boston, Mass. SIDNEY B. STRICKLAND, *Assistant Secretary*, 209 Washington Street, Boston, Mass.

1906

The Boston *Transcript* of September 7 included a notice about an exhibit of water colors by Edmund S. Campbell, IV, which was shown in the Old White Art Gallery at The Greenbrier, White Sulphur Springs, W. Va. Campbell is professor of art and architecture at the University of Virginia, curator of the University Museum of Fine Arts, and Secretary of the Virginia State Art Commission. He is a member of the Architectural League of New York City, the American Water Color Society, and the New York Water Color Club. After graduation he studied at the Beaux Arts in Paris and at one time taught architecture and art at the Carnegie Institute in Pittsburgh.

All of the Boston papers published about October 20 contained articles regarding our classmate, Reverend Michael J. Ahern, XII, who is head of the department of chemistry and geology at Weston College, training college for Jesuits in New England, and the largest institution of its kind in the world. Born in New York, Father Ahern was graduated from St. Xavier's College there in 1896, entering the Jesuit novitiate at Frederick, Md., that fall. He received his Master's degree in 1902. — After leaving Technology he went to Boston College as an instructor in chemistry and geology, remaining there until 1906. He was appointed professor of mathematics and instructor of geology at Woodstock College, Md., for a year, later spending four years at the University of Innsbruck, Austria, in the study of theology. He was ordained in 1910. The following year he was named head of the department of science at Canisius College, Buffalo, and then was sent to Boston College again, this time as head of the chemistry department. In 1919, he returned to Canisius College as President, which position he held until his transfer to Holy Cross four years later as head of chemistry. His next transfer took him to St. Joseph's College, Philadelphia, where he supervised the construction of new chemistry buildings. In 1926, he was assigned to Weston College, where he has remained since. October 20 marked the 25th anniversary of his ordination to the priesthood. A committee, organized to formulate plans to honor Father Ahern, suggested an extended vacation to Europe to permit him to visit Innsbruck, Austria, where he received part of his education, but Father Ahern preferred, if possible, the erection of a seismograph station at Weston College. Father Ahern is widely known as a lecturer, especially in subjects relating to science and religion. He is a member of the American Chemical Society and represents it as councilor and as director of radio broadcasting in the Northeast. We have had occasion to refer to him previously in this column on account of his radio broadcasts on scientific and religious matters.

Ralph Clarke, VI, who has been associated with the Henrici Laundry Machinery Company in Milton, Mass., for some years, is now Vice-President and General Manager of the company.

Having used up all the items concerning classmates, we will again resort to the expedient of chronicling the doings of certain of their offspring. George Guernsey's, I, daughter Mary received the high honor this past summer of being one of the two girls sent from the United States to represent the Girl Scout organization at the International Chalet in Switzerland. This Chalet, which is located at Adelboden, was presented by Mrs. J. J. Storrow of Boston, and the meeting this past summer was a gathering of Girl Scouts from about 30 different nations. It was a signal honor to have the privilege of attending from this country. George is Treasurer of the Dana Hall School at Wellesley and Mary is now a member of the freshman class at Wellesley College.

Speaking of colleges, if I am not mistaken, Ned Rowe's son is starting on his senior year at Technology and, as a member of the U. S. Reserve Officers, spent part of his summer training with the Artillery Reserve Officers at Fortress Monroe, Va. — Charlie Wetterer's son is now in his sophomore year at Tech. — Frank Benham's younger son, Walter, entered Bowdoin College this fall as a member of the freshman class. — Your humble scribe reports a son as a junior at Harvard and a daughter as a freshman at Mount Holyoke.

As these notes are for the December issue, you will be reading them about six months previous to the time of our Thirtieth Reunion. Remember, therefore, that we will have a reunion in 1936, somewhere, in the early part of June. Please be thinking about it and making your plans to attend. — JAMES W. KIDDER, Secretary, Room 1001, 50 Oliver Street, Boston, Mass. EDWARD B. ROWE, Assistant Secretary, 11 Cushing Road, Wellesley Hills, Mass.

1907

Through Lawrie Allen we have learned that Clarence Howe was elected a member of the Canadian Parliament from Port Arthur, Ontario, on October 14, 1935, and, furthermore, that late in October he was appointed Minister of Railways, Canals, and Marine for Canada, an office corresponding to Secretary of the Interior of the United States. We understand that this appointment came, not because of political activity, but because of our classmate's outstanding engineering ability. This is probably the most notable success achieved by any 1907 man in a field outside of business. Congratulations to him!

In the October Review we recorded the serious illness of Walter Bigelow, and now we have to tell of his death which occurred on October 4. The Boston *Herald* of October 5 contained the following announcement: "Funeral services for William Walter Bigelow, construction engineer, who died yesterday, will be held at the Bigelow home, 19 Fairfax Street, West Newton, tomorrow, to be followed by committal services at Oak Grove cemetery, Springfield. He was born in Springfield, a son of Mrs. Idelle J. Bigelow and the late William D. Bigelow.

"He was a member of the first class to be graduated from the Springfield technical high school and entered M.I.T., receiving his degree in 1907. He had been connected with several engineering firms in Boston, including Rich, Bigelow and Tirrell, Jackson and Moreland, and Metcalf and Eddy.

"He is survived by his widow, the former Harriett Foster, a foster-daughter, Barbara F. Livermore of West Newton, and his mother, who lives in Springfield. A sister, Mrs. Henry M. Wristom, of Appleton, Wis., also survives.

"He was a member of the Boston City Club, the Boston Society of Civil Engineers, and was a past chairman of the Society's Designers' Section. He was also a member of the Roswell Lee Lodge of Masons of Springfield."

It was the privilege of the Secretary to know Walter quite well, both during undergraduate days and also in later and recent years. At one time he was Assistant Secretary of the Class. A quiet, rather retiring fellow, he was genuine, sincere, painstaking in everything he undertook, a loyal friend, a good engineer. A note of sympathy went to his widow on behalf of the Class.

In October we were able to publish a letter from Sam Very, long among the missing as far as our class records were concerned, and now we have another letter of real interest from another classmate whose work and activities have seldom, if ever, been chronicled in *The Review*. A. T. Kolatschewsky, VI, whose address is Lanternhof Straat 113, Deurne-Zuid (Antwerp), Belgium: "I certainly remember you very well, and your letter of August 15 served to revive many and many a recollection. I know how much you have done and how devoted you have been to '07 during all these years and I wish to express to you my best thanks as a member of that glorious old clan for your interest in keeping us, as it were, all together.

"You ask me for a brief history of my doings since I left Tech. In 1909 I entered the engineering department of the Bell Telephone Manufacturing Company at Antwerp (Belgium) and in 1911 was transferred to St. Petersburg (Russia), where I organized the telephone branch at the factory of Messrs. N. C. Deisler and Company, who at that time were allied to the Bell Telephone Company and likewise the representatives of the Western Electric Company.

"In 1914 the Great War prevented me from returning to Belgium, so I had to stay on in Russia, whereas all our personal belongings (I say 'our' for I have been married since 1908) were shipped to Belgium and confiscated by the German authorities.

"In 1917 the Revolution broke out and then commenced for Russia and its people untold hardships: famine, disease, and complete financial ruin. During the Great War and also during part of the revolutionary period, I was mobilized and attached to the factory as a technician in charge of the field telephone and other signalization apparatus manufacture.

1907 Continued

"During my stay in Russia I designed and built many telephone central offices and other installations pertaining to means of communication. Although in 1924 my official title was technical director of the factory, political and other considerations decided me to leave the Soviet Union forever, and since 1925 I have constantly been working in the engineering department of the Bell Telephone Manufacturing Company at Antwerp. I am still hanging on today, so that, although not brilliant, my career has been somewhat adventurous and one day a book may be published (but no readers found) relative to some of the things seen from 1917 to 1924.

"I have not been back in U. S. A. since graduation and have met only three Tech men during all these years! Please give my regards to all who may still remember me and accept a hearty shake of the hand from yours cordially and sincerely. . . ."

In addition to this letter, Kolatschewsky returned the statistics form which we sent him, and from this we can add to the facts given in his letter a few items. He has a son, Nicholas, born February 6, 1910, and there was also a daughter, Maria, born in 1912 who died in 1915. From 1920 to 1924 he was instructor in telephony at the Electro-Technical Institute at Leningrad, Russia. He writes: "I still play the violin. Am very fond of water-color painting and have written ten comedies and plays for the stage. I don't smoke yet."

Classmates, are letters like this and the one from Very interesting to you? Would you like to have more of them? If any of you who read this have been out of touch with the Secretary for a long time, won't you write him a similar letter about yourself?

Professor Locke furnishes us with the information that John Kinnear, general manager of the properties of the Nevada Consolidated Copper Company at McGill, Nev., made an extended trip to central South America during the early fall, and also that Carl Trauerman was elected a member of the governing board of the American Mining Congress at the meeting of that organization in Chicago in September, 1935. Further news concerning Carl's activities is given in the following excerpts from an article in the *Pioneer Press*, St. Paul, Minn., of October 6: "Shuttling between Montana and St. Paul, since last September, two prominent Montana mining men and financiers have completed a deal, whereby the control and management of the famous Ruby Gulch mine again reverts to Montanans, according to Carl J. Trauerman of Butte, President of the Mining Association of Montana, who passed through St. Paul last week.

"Known as the largest low-grade gold mine in the United States, the Ruby Gulch mine, through its years of development, carries the romance of the district in which it is located, known as the Little Rocky Mountains, in Phillips county, about 50 miles south of the main line Great Northern station of Dodson.

"Mr. Trauerman entered the district

as a young engineer and metallurgist over 20 years ago, fresh from Boston Tech, where he had received his engineering education. He had been instrumental in inventing and improving some of the machinery used in the world's leading cyanide plants today. Since then he has been a consulting engineer, devoting a greater part of his time to mine financing. . . .

"Trauerman started negotiations in September, 1934, to take over the Ruby Gulch stock left by Mose Zimmerman at his death. . . . Early in June this year he was elected President. . . . The Ruby Gulch Company is now fully financed, according to Mr. Trauerman, and is building a mill of 300 tons daily capacity, to use a solution of sodium cyanide to extract the gold values from the coarsely crushed ore. The new mill will be in operation shortly and it is believed the rejuvenated company will again resume the payment of dividends before the turn of 1936, Mr. Trauerman said.

"Mr. Trauerman, besides being President of the Ruby Gulch company and the Mining Association of Montana, is nominee for chairman of the board of the Montana Silver Association; President of Basin Goldfields, Ltd.; editor of the Montana *Natural Resource Bulletin*; director of the National Gold Mining Association of America, member of the governing body of the American Mining Congress; a member of the minerals division of the Montana Planning Committee; member of the Montana Copper Tariff Commission and recently administration member of the Montana Retail Coal Code under the NRA." — BRYANT NICHOLS, Secretary, 126 Charles Street, Auburndale, Mass. HAROLD S. WYNSON, Assistant Secretary, Commonwealth Shoe and Leather Company, Whitman, Mass.

1908

Announcement has been received of the opening of the new Dubuque Bank and Trust Company, 9th and Main Streets, Dubuque, Iowa, with Jim Burch as President.

We have the following changes of address to report: Charles C. Benton, Charles C. Benton and Son, 509-512 National Bank, Wilson, N. C.; Professor Henry W. Blackburn, 432 Fellows Avenue, Syracuse, N. Y.; Ygnacio S. Bonillas, Apartado Postal 9081, Mexico, D. F., Mexico; Amos H. Dows, Littleton Street, Chelmsford, Mass.; Captain Waldo P. Druley, Navy Yard, Mare Island, Calif.; Lynn S. Goodman, The Edison Electric Illuminating Company of Boston, 182 Tremont Street, Boston, Mass.; Gerald T. Hanley, Warren, R. I.; Chester B. Lambirth, 6237 Bona Vista Place, Pleasant Ridge, Ohio; John F. Leary, 202 Merrimac Street, Newburyport, Mass.; Emerson F. Lyford, 37 Sheffield Road, Newtonville, Mass.; Rodolfo Ogarrio, The Texas Corporation (Vice-President), 135 East 42nd Street, New York, N. Y.; Harold B. Pickering, 303 Lafayette Street, Salem, Mass.; Edward A. Plumer, 142 Eppingham Place, Westfield, N. J.; Frank W. Sharman, 1216 North Cherry

Avenue, Tucson, Ariz.; Mrs. John H. Williams, 15 North Franklin Street, Wilkes-Barre, Pa.; Rufus W. G. Wint, 2933 Turner Street, Allentown, Pa. — H. LESTON CARTER, Secretary, 185 Franklin Street, Boston, Mass.

1909

I am sure all of our Class will be pleased to hear of the honor which has been conferred upon Dr. Charles Camsell, Deputy Minister of the Federal Department of Mines of Canada, who has been made a Companion of the Order of St. Michael and St. George; by His Majesty, King George V.

Following graduation from the University of Manitoba, Camsell spent the next six years exploring the Mackenzie River basin and the region west to the Pacific Coast. After many privations and disappointments he joined a geological party making a survey of Great Bear Lake region. Then followed explorations of the Moose River basin for the Algoma Central Railroad, and in western Ontario and northern Manitoba for the Canadian Northern Railway Company. In 1904 he joined the permanent staff of the Geological Survey of Canada, and in 1920 he was appointed to his present position. In the meantime he had been continuing his studies at Queen's, Harvard, and M.I.T.

He has served on many important committees and is a member of the Royal Geographical Society (Fellow, 1915); Geographical Society of America (Fellow, 1916); Royal Society of Canada (Fellow and Honorary Secretary, 1918; President, 1931); Canadian Institute of Mining and Metallurgy (Vice-President, 1921-1922); Engineering Institute of Canada (President, 1932); Canadian Geographical Society (President and one of the founders); American Institute of Mining and Metallurgy.

In 1922 Camsell received the degree of LL.D. from Queen's University and also from the University of Alberta in 1929; he was awarded the Murchison Grant by the Royal Geographical Society in 1922 in recognition of his services in exploring northern Canada; and received the Gold Medal of the Institute of Mining and Metallurgy, London, in 1931 "for his untiring zeal and great ability in promoting the development of the natural resources of the Dominion."

Hardy Cook has been appointed Director of Personnel of the Brooklyn Edison Company, with which he has been associated since the fall of 1910.

From R. W. Riefkohl comes the following: "The alumni office is just one jump ahead of me in notifying you of my recent promotion to lieutenant colonel on August 1. As a matter of fact, I intended to write to you a few days ago, the urge having arisen after the receipt of a recent number of *The Technology Review*.

"I greatly appreciate your letter and congratulations. In compliance with the request contained in your letter, I submit the following, which may prove of interest to other members of the Class.

"Notwithstanding the almost unsur-

1909 Continued

mountable difficulty which I encountered while at Tech in struggling through the course in political economy (economics was so referred to in the old days), under Professor Dewey, I now find myself teaching business economics and business administration at the Quartermaster Corps School of the Army, located at Schuylkill Arsenal, Philadelphia.

"In the fall of 1931, I entered the Harvard Graduate School of Business Administration, having been detailed to that duty by the War Department; and I slaved at that most excellent institution for two years, graduating in 1933, with the degree of Master in Business Administration. This course was preparatory to the work on which I am now engaged, and which I may say is vastly more interesting than I ever had dreamt of.

"The one thing that I regret about the two years at Harvard is that they managed to keep me so busy that I did not have any time in which to look up old friends in Boston. When vacation time came, I was busy, either in catching up with work, or in making industrial studies pertinent to the Army's program of industrial mobilization for national defense. I hope that some of these days I shall be sufficiently near Boston, at the time when the class reunion takes place, to permit me to be present and meet members of the Class."

Chet Dawes received honorable mention for his paper, "Encouraging Initiative in the Engineering Student," presented before the American Institute of Electrical Engineers. Chet has been engaged as an "expert witness" on patent cases for the Warren Telechron Clock Company and the General Electric Company.

On September 11 Maurice Scharff addressed the luncheon meeting of the Midday Club, New York City, on the provisions of the Public Utility Act of 1935, with particular reference to those provisions which have, or may have, a relation to the practice of consulting engineering.

The fall luncheon meeting in New York was a great success, as the Class had the privilege of entertaining Dr. Compton as its honored guest.

Writing about this meeting, Paul Wiswall says: "These class luncheons that we have here in New York twice a year have been particularly good get-togethers since the 25th reunion. I think we discovered that the officers of the Institute like an informal party as well as the 15 or 20 regulars who have met for over ten years. On October 26, at the Tech Club, we set a peak by turning out almost 30 men to greet Dr. Compton. Thanks to the good work of Hardy Cook, the entire roster of '09 men in the Metropolitan District was given personal invitations. We had plenty of competition with football games everywhere, yet Bob Doane and Harry Jarrett and Bill Read came, I think, for the first time and John Hutton was one whom we had not seen for a long time. They were most welcome, I assure you, and we all hope to see them again. Dr. Compton entertained us for almost

two hours with news of the Institute. All he said plainly told of the good work that was being done at Cambridge and I feel that he continues to make us who are not in Boston and rarely see the Institute feel that under his skillful direction the work at Cambridge is in most capable hands. It is a comfortable feeling to us who feel our obligation for what the Institute did for us."

Al Glassett '20, President of the Tech Club, was also a guest of the Class. — Jim Critchett reported on the conference he and Molly Scharff had with Horace Ford about the Class Fund. — Colonel Carter, who is teaching at West Point, expressed regret at being unable to meet Dr. Compton and the members of the Class, but was prevented from attending the luncheon by a previous engagement of long standing.

Tom Desmond was prevented from attending by unforeseen circumstances. He writes to Paul: "I have now completely recovered good health after my serious attack of pneumonia of last year and the long and slow convalescence which followed. The doctors say that I am now just as well as ever and I am able to resume all of my normal activities. As you know, I had planned definitely to be with you all at this luncheon and am very sorry that for the reasons explained above it will not be possible for me to be with you. Permit me to say again, however, how much I appreciated the expressed interest of you and other classmates in my welfare during my long illness. This interest did a great deal to cheer me up and to assist me on the road to recovery and I am very grateful to you. I shall be coming to New York City again before long I hope, and I intend to look you up at the very first opportunity."

Reg Jones is just back from about two-and-one-half months abroad, most of which was spent in Paris. He also traveled in Holland, England, and Germany. — From George Gray we learn of the death on June 8 of both Harry Putnam and his wife, who were killed in an automobile accident. The driver of a Ford vegetable truck was held in criminal negligence.

The following clipping was taken from a recent New York paper: "Mrs. Franz Schneider, wife of the Vice-President of the Newmont Mining Company, died yesterday of a heart ailment at her home, 1105 Park Avenue. Before her marriage she was Miss Alice Carroll."

Paul Wiswall also writes: "The other Sunday, I went to Chet Pope's new home to a housewarming. You knew that Chet was married last year. He has just finished a beautiful great home almost on the crest of the Orange Mountains in Maplewood, N. J., where he has such a view across to the Manhattan skyline as you see described in books. I know of no finer outlook anywhere in the Jersey suburbs and that is saying a great deal. Chet has a fine big family in his new home. There are Ruth, now 14 and as slender and graceful as any girl you ever saw, Marcia's two boys by a former marriage, and a new daughter, Diana, about two months

old." — CHARLES R. MAIN, *Secretary*, 201 Devonshire Street, Boston, Mass. *Assistant Secretaries*: PAUL M. WISWALL, MAURICE R. SCHARFF, New York; GEORGE E. WALLIS, Chicago.

1910

The following changes in address have been received during the past month: Bertholf M. Pettit, 2400 16th Street, N.W., Washington, D. C.; Walton G. Harrington, 1220 Mills Tower, 220 Bush Street, San Francisco, Calif.; Philip W. Burnham, 9 East 46th Street, New York, N. Y.

In taking over the duties of the Class Secretary, the new Secretary noted that in all the issues of *The Review* our former Secretary, Dud Clapp, has said very little about himself. It may be well then for us to know something of Dud's history. Dud lives in Cambridge and has a very charming family, two daughters nearly the same age who are rapidly growing up. From all that we hear, they keep Dud busy, acting as chauffeur taking them to parties, or waiting up late for them to be sure that they arrive home safely. Dud has started a business of sulphurated oils and textile soap, and his plant is located in Cambridge. He had a hard time getting his business started; but with his usual intensity of purpose, he has succeeded to a point where it is still growing and he is considering enlarging. I have often wondered how Dud was able to do so well with his job as Secretary, due to the fact that he has spent every available moment in his business. I know the entire Class is very grateful for the services he has rendered and wishes him all sorts of luck.

Cliffe Waldo, who lives in Newton Centre, is still a certified public accountant and is doing very well. He has a daughter who is now attending Dana Hall. — C. W. Wallour lives in Newton Centre also, and he has a fine family, two boys and a girl. — Dan Gibbs is the architect for the new High School Gymnasium at Waltham, and he is associated with Kilham, Hopkins and Greeley on this work. — Russ Wells of Pottstown, Pa., was in Boston with his wife last month. They were making a pleasure trip out of a business trip, visiting various dealers throughout the New England States. Russ manufactures gas stoves, combination stoves, and furnaces; and he claims business is very good, possibly due to the F.H.A. which allows loans on this product. — HERBERT S. CLEVERDON, *Secretary*, 46 Cornhill, Boston, Mass.

1911

Roger Loud, VI—Uncle Roger to his Edison pals of 20-odd years' standing — has accepted the chairmanship of our Twenty-Fifth Year Reunion Committee and the success of our Silver Anniversary is thereby assured! The dates? You know them: Friday, June 5, to Monday, June 8, 1936. The place? A resort hotel within 50 miles of Boston, to be decided later by the committee. The publicity campaign will soon be in full swing, but right now make sure you have checked the dates on your 1936 calendar.

1911 Continued

Another 1911 junior marriage: Mr. and Mrs. George B. Forristall announce the marriage of their daughter, Barbara, to Mr. Leon Huck on Wednesday, September 11, at Houston, Texas. Good luck to the young couple!

During the last week-end in September, as has become my custom in nine of the last ten years, I attended the annual Freshman Camp of M.I.T. at Dunstable, Mass., and was delighted to find four Sons of 1911 at the camp as members of the Class of 1939: Jack Darrow, son of B. Darrow, VI; Jack Herlihy, the Assistant Secretary's son; C. F. Hobson, Jr.; and Oswald Stewart, 2d. Among the counselors was Frank Parker '36, son of Ted Parker, XI, and this year's Tech basketball captain and Treasurer of the Athletic Association.

Our classmate, A. V. de Forest, XIII, Associate Professor of mechanical engineering at M.I.T., attending the Guggenheim Institute lighter-than-air conference in Akron this summer, vindicated the Goodyear-Zeppelin Corporation and laid the blame for the costly *Macon* crash directly at the door of the Navy Department when he said: "Because the Navy Department was obsessed with the fear of having the *Macon* dirigible too heavy, it lost the ship." Alf added that too much red tape was manifest in the entire case and the Goodyear concern should have been in direct communication with the "operating arm" of the Navy, instead of dealing through middlemen. This is the way things are handled in Germany, he said, which accounts for the fact that they have few lighter-than-air accidents.

Had a nice renewal of acquaintance with Ken Faunce, VI, in late October when he came here for a luncheon of New England insurance agents. He is with John C. Paige and Company, Boston. — We learn from the Alumni Office that Jim Greenan, III, is still in the Philippines, but has changed his locale from Baguio to Manila, where he is on the Fourth Floor, Reyes Building, Plaza Cerantes.

Ere these notes appear, we will have had our usual 11th day of the 11th month dinner at Walker Memorial and a full account of the proceedings, together with more details on the reunion, June 5-8, will be found in the next issue. Watch for it and write to Dennie before New Year's. — ORVILLE B. DENISON, Secretary, Hotel Bancroft, Worcester, Mass. JOHN A. HERLIHY, Assistant Secretary, 588 Riverside Avenue, Medford, Mass.

1912

Here and there, we run across indications that the Class is becoming reunion-conscious. Charles H. Carpenter, II, who is now back in New York with the Belgrave Press, dropped in to see us and to make a few suggestions looking toward our Twenty-Fifth. Charlie has been doing some thinking about it, and we only wish a few more classmates would likewise come through with an idea or two. Carpenter's suggestions were as follows: (1) To consider combining with the 50-

year class and the 1937 graduating class for an outing in connection with reunion activities; (2) to take up with some travel agency the possibility of working out a scheme whereby, for a flat-rate assessment on every member of the Class, everybody could have transportation to Boston from any part of the world; and (3) to secure a photograph and letter from every member of the Class to put on a projector at the reunion. — There they are! Who will come through next with other constructive suggestions. The more we have to turn over to the Reunion Committee, the better chance we have of beating our 1932 record for attendance.

Skipper Harrington, I, is gradually recuperating from the illness and breakdown he suffered after too many long hours on the toughest kind of construction work for the Patrick McGovern, Inc. We met him near the Grand Central Station one beautiful mild October noon, and he was looking fine, except for being a lot too thin. He had spent the past summer in the New England hills, and the spring in Arizona, and is slowly but surely winning his grim fight to recover health and strength.

Practically every classmate we meet tells us that the first thing he does when *The Review* arrives is to look for the notes of the Class of 1912. Almost every time when we have gone to press with a slim quota of notes, or no notes at all, we bump into somebody who undertakes to give us a little well-meant criticism of the job we are doing. And almost invariably the criticism comes from some lad who hasn't written a word to his Class Secretary since 1912.

We have to thank Page Golsan, VI, for thinking up a scheme which got us quite a nice bunch of news and, at the same time, did the whole Class a service of great practical value. As a result of his voluntary effort, we now have an up-to-date register of our classmates and their correct addresses. Copies have been sent to every one and if you failed to get yours, just write to Shep or Mac, or direct to Page Golsan, Vice-President, Ford, Bacon and Davis, 39 Broadway, New York, N. Y.

Out of a voluminous correspondence which Page has kindly turned over to us, we have selected some items which we think may be of widest general interest. Max C. Mason, VI, speaking: "My connection with the Potomac Electric Power Company dates from June, 1932. Before that I spent an even 20 years with Stone and Webster Engineering Corporation, mostly on special report work. At present I am engaged principally in developing a system of continuous inventory and unit-cost records for the company." His position is entitled "Survey Engineer." — Eric Kebbon, IV, expresses the official and hearty thanks of the Class to Golsan for his initiative and generous activity in getting up this list. Keb says: "It will serve, I am sure, to bind the Class more closely together and to help enormously in locating the men for our Twenty-Fifth Reunion." (Note: Only one year from next June, men!) — Parker J. Brown, IV,

writes: "As the firm of Silverman and Brown has been dissolved for several years, I am now carrying on the business myself under the name of Parker J. Brown, Architect, 51 Cornhill, Boston, Mass."

— From A. F. Allen, XI, who is with the New York State Department of Health, comes news of a change in location and duties. He says: "On July 1, I was transferred from Buffalo, where I was District Engineer for some five years, to Albany to undertake the establishment of a new Bureau of Camp Sanitation. The work of organizing it was seriously interrupted by some three weeks' absence at Birmingham in undertaking the repair of damage done to sanitary facilities by the flood in that vicinity." — E. M. Giesey, another Course IV man, gives us the following information: "During the past year I was Professor on the Faculty of Beckley College (West Virginia) and Librarian of the institution. I shall continue my connection with the college this coming year, but at present I am also the County Manager of the Raleigh County Campaign, Better Housing Program. We are situated in the heart of the coal region which has gone through the depression without having felt any of its effects. At present we have applications for loans of over \$400,000 to build new homes. The banks have agreed to loan a million dollars on government insured mortgages. I am finding this work intensely interesting and it is an opportunity to serve the public."

We hadn't heard anything of, or from, Arthur T. Bennis, VI, until he returned his copy of the first proof of the new list with the brief comment that his profession was that of certified public accountant in Punxsutawney, Pa. If we could find out where that town is, we might try to stop there sometime and see what Bennis looks like after all these years. — A great many other classmates wrote to Golsan, commenting and thanking him for getting up the printed list of names and addresses, but with the customary modesty and reticence of 1912 men, they refrained from furnishing any clue whatsoever to their own activities and progress. However, we hope to be able to have a few more of these items for you in the next issue.

Jerome C. Hunsaker, Head of the Aeronautical and Mechanical Engineering Departments of the M.I.T., has become technical adviser to the United Aircraft Manufacturing Corporation. Dr. Hunsaker, who was formerly Vice-President of the Goodyear-Zeppelin Corporation and a member of the Bureau of Aeronautics while a Commander in the Navy, served as a member of the Federal Aviation Commission last year. He was the first President of the Institute of the Aeronautical Sciences. — V. L. Gallagher has been made Western Manager of the Pearl-American fleet of fire insurance companies, with headquarters at Chicago. For some time, Gallagher has been Secretary of the Continental, Fidelity-Phoenix, and American Eagle Insurance Companies. — FREDERICK J. SHEPARD, JR., Secretary, 125 Walnut Street, Watertown, Mass. DAVID J. McGRATH, Assistant

1912 Continued

Secretary, McGraw Hill Publishing Company, Inc., 330 West 42d Street, New York, N. Y.

1914

As the seasons roll around once again, the appeal is made to all classes to help further the general fund for the improvement of intramural athletic conditions at Technology. Because of the almost complete absence of competitive sports with other colleges, the income available for athletic promotion is exceedingly meager. Some of the expenses are defrayed by the Institute, others by a proportion of the student tax paid by the students themselves, and a balance raised from year to year by generous Alumni. The funds have been exceedingly carefully spent, and under the able leadership of the late Dr. Rowe, intramural athletics at Technology were elevated to a plane high in American colleges. Without the very able help of Dr. Rowe, the raising of these funds is bound to be more difficult. Ralph Joep '28 has taken over the task of again trying to get \$25 a year from each class. In memory of the good work done by Dr. Rowe and as an encouragement to the splendid effort that Mr. Joep is making to carry on, let us see if we cannot do our share. If you can spare 50¢, a dollar, or more, please send it to your Secretary to be included in the class fund.

Major L. W. Burnham, of the Marine Corps, who has been in Nevada in recent years, expected to be stationed at Quantico, Va., this year but after a two months' leave this summer his orders were changed, and he is now inspector-instructor of the Tenth Battalion, Fleet Marine Corps Reserve, at New Orleans, La. Burnham and Ricker expect to get together shortly to uphold the traditions of 1914, and we believe there is no question that they will be ably upheld by the pair.

Frank Ahern, who is fire protection engineer of the National Park Service, of the Department of the Interior, was the coeditor of a publication entitled, "Emergency Conservation Work Safety Regulations." This is a manual issued to the commanding officers of the various CCC Camps. Frank's work deals with fire protection, particularly as applied to the temporary structures being used in these camps.

Sensing the popular demand of the day, Frank H. Mahoney '13 is now established as manager of the Green Mountain Distillery Company, at Burlington, Vt. It is understood that Frank is trying to make rum from maple syrup. Perhaps '14 will be called upon for volunteers to try out the new product. — HAROLD B. RICHMOND, Secretary, 30 State Street, Cambridge, Mass. CHARLES P. FISKE, Assistant Secretary, 1775 Broadway, New York, N. Y.

1915

This is a bit early, but nevertheless a happy and enjoyable Christmas holiday to you and your families and a successful and profitable 1936 to you all in business. Next month we should have the report of our first class dinner with the movies of our Twentieth Reunion as entertainment.

This will of necessity be in Boston, but later in the winter I think we can show them in New York. Scattered correspondence from Allen Abrams, Loring Hayward, Louie Zepfler, and a few of the other boys keep me in touch with the Class, but we must have letters with definite news to keep our column going this year. Ralph Hart, whom everybody remembers at the reunion, was seriously injured on the Stafford Springs road while motor-ing to Boston for the Labor Day weekend and has only recently returned to business from a long convalescence. As badly as Ralph was injured, we are all glad to know that he has fully recovered. Herb Anderson, our jolly story-teller, is making some attractive knitted covers and coasters for glasses. He calls them "Hi-jacs" and "Lo-jacs." Hi-jacs, I take it, are for high balls, but how about the Lo-jacs?

From the Reunion, Doug Baker took his family to Gloucester, Mass., for the summer. Before returning to Paris he wrote me: "I much regret not having had an opportunity to see you again on this trip. My vacation is over. It has been most enjoyable. In the short time I have been here, I have been fortunate enough to see many of my friends, although in no case have I been able to see them as much as I should have liked. My family is thoroughly sold on the U.S.A. Good wishes and best regards to you all." — When Alfred H. Schoellkopf gets into the news, it's always important. On October 15, Schoellkopf resigned as Chairman of the New York State Temporary Emergency Relief Administration, a position he has held since 1933. Governor Lehman paid him a splendid tribute when he left the office, especially for his devoted service in this responsible position without remuneration.

Lorin G. Miller is an associate professor at the Michigan State College, East Lansing, Mich., in the Department of Agriculture and Applied Science. — At the well-known annual Brockton Fair held each September at Brockton, Mass., Horatio W. Lamson came in for some newspaper write-ups on his optical gymnastics produced by use of stroboscopic light. As you know, Lamson is with the General Radio Company at Cambridge and with his stroboscope he gave a fascinating demonstration of high-speed devices, varying from impressive scientific revelations to humorous antics. Viewed through the stroboscope, objects moving at high speed appear to be stationary. — Professor Victor J. Trushlevich of the Institute of Mines in Moscow reports that his Russian book on ore dressing is going through the press, and should be out this fall. His living conditions are much improved because, as he expresses it, he now has for his wife and 16-year-old son an apartment of three very good rooms in a house built especially for professors. A three-room apartment might seem rather small to some of the Technology professors. He and his family were spending the two months of August and September on a river boat trip of 20 days to see the river system, Moscow, Oka,

Volga, one canal, and some small rivers. This trip began at Moscow and extended to Vologda and return.

This is the first chance I've had to give you Phil Alger's letter of November 24, 1934, from Schenectady: "In these days of alphabets and budgets, it is difficult to find time for the amenities of living, but here in Schenectady we are succeeding in getting some entertainment and advance education by the study of politics. I believe that, whatever may be the right thing and whatever we may ourselves want, we must look forward to having the Government take a continually greater part in our daily lives. On this basis the thing to do appears to be to set about so improving our Government that it can do its job creditably, hence a group of us here, including Dick Rhea '24 and Florence Fogler Buckland '20, organized the Schenectady Charter League and conducted a successful campaign for the adoption by Schenectady of the City Manager form of government made famous by Cincinnati. It has certainly been a vivid education to us all to talk politics with residents of all of our varied 14 wards and 77 precincts and to learn to count as friends men and women of all ages, creeds, and complexions. There's a lot more to be learned than was ever uttered in the old halls on Boylston Street. I enclose a photograph of our summer place, Playfield, in Quincy, N. H., near Plymouth, where I hope you and the other classmates may visit us in summers to come." From this you can see Phil has time away from his busy duties to be interested in such praiseworthy civic work. It's sad to recall the death on May 26 of Phil's ten-year-old daughter, Catherine. I am sure that our Class, especially the men who know him and Mrs. Alger personally, will join in sending them our sincerest sympathy in their sadness. — I've used up all my letters. From now on, it's up to you chaps to keep me supplied with news. Write. — AZEL W. MACK, Secretary, 72 Charles Street, Malden, Mass.

1917

Jules Gagnon came out of his lair and immediately started discussing the recovery of potent extracts from endocrine glands. It became apparent that he had been working some six years at Harvard Medical School, buried deeply in this special phase of medical research. Through court decisions, funds which were for the research on which he has been engaged have been cut off and he is now seeking some new opening, preferably along related lines. He is living at 491 Huntington Avenue, Boston. Incidentally, he asked what I could tell him of Frank O'Hara and that was very little. I hope that either said O'Hara or some one of his friends — or enemies for that matter — will see this note and be kind enough to bring us all up to date.

Stanley C. Dunning, sales manager of the Muralo Company of Staten Island, New York, snatched a bit of time from a busy Boston trip for a visit. As always, he had words of appreciation for various people with whom we both come in

1917 Continued

touch and he made the sun shine more brightly on a cloudy day. It seems, moreover, that the ubiquitous John M. DeBell had been in to see him and that Stan was thus favored by winning a beauty contest, John having seen his picture in a paint-trade journal when he was seeking suitable contacts for the preliminary trial of some of his fancy cellulose compounds. Stan commutes from Staten Island, spending two hours a day on ferries and subways and then gets his rest by frequent sales trips for the company. Members of the Class who are at all familiar with the selling of paint products will know how much rest a paint sales manager gets during the year.

One of the major problems of the nation is to be attacked by the press with Linwood I. Noyes sounding the tocsin at the Chicago meeting of the Inland Daily Press Association: "Mr. Noyes, publisher of the Ironwood (Mich.) *Globe*, called on the newspapers of the country to lead the way in a 'relentless campaign' to 'check the frightful toll' of mortality and injuries in motor-car accidents until 'there is some semblance of safety in motoring.'"

"Citing the indicated 1935 up trend over the 36,000 fatalities and nearly one million casualties from motor accidents in 1934, Mr. Noyes asserted the press could 'do more than law and enforcement officers' in popularizing sane driving. 'It is worse than war,' he said in pointing out that, at present rates of motor-car deaths, a number equal to the entire population of Indianapolis, Kansas City, or St. Paul is wiped out each decade.' He noted an 'awakening in the press,' already reflected in increased activities on the part of state legislatures and highway officials, and suggested a new style in reporting accidents might speed the campaign. 'Heretofore, newspapers have had a tendency to omit gruesome details,' he said. 'Train wrecks, motor-car accidents, fires, explosions, and the like are accompanied by suffering and horrors that are terrible to see. Reporters have omitted details to spare readers.' But 'realistic journalism,' he added, 'might enable drivers and pedestrians to realize and fear rather than court the dangers that beset those who ride and walk.'"

We may judge from this that newspaper accounts may begin to be more effective than ever, even if they are at times a bit startling.

If Lin's endeavor to save lives results in making our newspapers yet more gruesome in their details, other former students of Course IV are doing their best to offset the effect by beautifying many of the horrible examples of Victorian architecture. Frederic Leslie Ford has been awarded the bronze medal of *Good House-keeping* magazine for the best exterior remodeling work in the State of Massachusetts. The contest was conducted by the magazine nationally, in coöperation with the Federal government's national housing movement, in an endeavor to show how successfully an old-fashioned type of building can be altered at moderate cost to meet present-day standards of grace and beauty. The Massachusetts award

was based on remodeling of the residence of Mr. and Mrs. D. M. Houghton, in Auburndale. Before-and-after illustrations showing the pleasing change appeared in the Boston *Transcript* for September 27 with the following editorial comment: "The completed work has produced a house of considerable charm and beauty and illustrates clearly the results that may be obtained by intelligent and carefully studied alteration work. Mr. Ford was graduated from the architectural school at Technology and studied with Eric Gugler in New York. One of his house designs won an 'honorable mention' in the recent Jordan Marsh Company's contest."

Another Course IV man, Paul Gardner of Tech Show fame, has for two years enjoyed the title and responsibilities of the directorship of the William Rockhill Nelson Gallery. This gallery is reported to be one of the most charming museums that could be conjured into being. Its collections are notable, especially in the Chinese and Japanese fields. It has several exquisitely chosen early American rooms from Salem, Virginia, and the Carolinas and, withal, its appointments are cleverly designed to insure comfortable conditions under which the manifold treasures may be viewed. Our congratulations to Paul and, incidentally, to the Course IV Faculty of the 1913-1917 period who instilled an appreciation of fine arts into the members of our Class who exposed themselves to architectural studies.

Another Course IV art student, who has since specialized more in psychology than art, landed in St. Louis recently and was received with all the attention and courtesies due one of the most successful of the country's undergraduate deans. Lobby was a bit disappointed not to find Carl Dean in the reception committee, but from reports one gathers that he may merely have been lost in the great crowd. C. H. M. Roberts was on hand, however, as was Joyce R. Kelley and several of his younger assistants together with a number of Carl's associates at Monsanto.

I saw Leon McGrady in Rochester and find him all enthused about the prospects of the coming 1937 grand reunion of the Class of 1917. He has been in frequent correspondence with one E. B. (ad lib.) Stockman and others in New York who have concocted a mighty scheme guaranteed to insure the success of the reunion in spite of pinched household budgets or other ordinary obstacles. More about all that later, but in the meantime, Mac would be glad to receive any further suggestions that may be forthcoming. — RAYMOND S. STEVENS, *Secretary*, 30 Charles River Road, Cambridge, Mass.

1918

We searched in vain for some terse and elegant phrase with which to describe the eager reception the newspapers gave Arthur C. Hardy's ('18 by adoption) announcement at the Biltmore Hotel (New York, of course) that color decreases sales resistance. That causes a mind with such pesky habits of wandering as ours to think at once of milady's cheeks, but

Hardy was thinking of toothbrush handles; red toothbrush handles, to be exact. Next time the Mrs. tells us with shining lucidity to bring home some bright flowers for the table, we shall give in to the red carnations without even a struggle.

Franklin Wells, still as self-controlled and passionless as the multiplication table, visited us in October, reporting that Bendix — of which he is assistant to the director of engineering of the Products Corporation — hired three graduates of the '35 model and he thinks highly of 'em. He jolly well ought to with all the improvements in teaching methods which the Institute has undergone in the past five years. Frank allows as how he has one son in the second grade and a daughter in kindergarten, all of which gives us the feeling of a gnarled and decrepit old man, decayed, and about to make his peace with God. Our daughter takes entrance exams for college in June and her brothers are hard upon her heels. Has any member of the Class a child actually in college yet? Who else is about to mortgage the old home, a sacrifice on the altar of college education for the young?

By way of the columns of *The Tech*, that tortured campus organ, comes an additional item from Fred Norton's trip to Europe. Sez he: "Building trades and allied professions are booming in the districts I visited in England and Scandinavia." Incidentally, under Fred's artistic direction, the Ceramics Division at Technology has a very attractive show case in the main lobby and estimates that it has enough material to offer a different display each month for several years.

As this is being written, the trees are blushing with that incommunicable riot of color with which the leaves welcome the first kisses of the frost, but it will reach you in December. May your holidays be filled with laughter and good works and loving kindness. — F. ALEXANDER MAGOUN, *Secretary*, Room 4-136, M.I.T., Cambridge, Mass. GRETCHEN A. PALMER, *Assistant Secretary*, The Thomas School, The Wilson Road, Rowayton, Conn.

1921

Early this year we asked everybody to drop us a line so that our Class History might be as up to date as possible for the Fifteenth Reunion next June. While the rush of replies will hardly bring about the restoration of the two-cent postal rate, we are hearing from many of the Class who have not contributed news of themselves for a long time. Second notice to everybody: write to your secretaries today to tell us of your doings and then remind your nearest classmate to go and do likewise!

An article from the September 14 issue of the Boston *Herald* strikingly illustrates one of the widely differing fields of activity in which our classmates are engaged: "The Reverend Samuel H. Miller, who will begin his ministry at the Old Cambridge Baptist Church tomorrow, came here from the Baptist Church in Clifton, N. J., where for the last two years he was

1921 Continued

chairman of the 'Committee of Fifty for Social Action,' a group of ministers who investigated the social and industrial conditions of the strike-infested area of Paterson and Passaic. He was also chairman of the New Jersey Baptist Convention Committee on Religious Education and has contributed to various religious journals, being represented in MacMillan's 'Prize Sermons.' He received his education at Technology and Colgate, where he was accorded Phi Beta Kappa honors and the Bachelor of Theology degree."

Victor E. Stevenson is with the Lautaro Nitrate Company of Chile, connected with their mining operations at the Pedro de Valdivia plant.

Industry continues to recognize the sales value of an engineering background. Witness the interesting note received from the enterprising New York head office of the International Business Machines Corporation regarding Arthur N. Brambach, senior salesman of electric business machines in the Seattle office of that company. For the third successive year, Arthur has been elected to the company's "One Hundred Percent Club" of sales leaders, entitling him to attend the annual convention in New York next year, at which time we will endeavor to ascertain for Review readers how it is done in Seattle! Starting as a student salesman in 1931, Arthur's progress through the company's sales school resulted in his becoming junior salesman in Philadelphia and later senior salesman in his present location. Of course, we should welcome a Christmas present of one of those splendid electromatic typewriters, with the automatic class notes attachment, to lighten your Assistant Secretary's job of punching an antiquated "mill" to transfer these random thoughts to paper!

Ray joins us in a cheery "Merry Christmas and Happy New Year" to everybody! May the brightening skies forecast the grand realization of most of our fondest hopes, attended by good health and unbounded measures of happiness! — RAYMOND A. ST. LAURENT, *Secretary*, Rogers Paper Manufacturing Company, Manchester, Conn. CAROLE A. CLARKE, *Assistant Secretary*, Acousticon Division, Dictograph Products Company, 580 Fifth Avenue, New York, N. Y.

1922

This, the second of the new series of '22 notes, goes to press before the issue carrying the first consignment of news reaches subscribers. We have, therefore, had no opportunity as yet to feel the effect of the eloquent appeal to you gentlemen to release your suppressed urge to tell the world in general, and readers of The Review in particular, all about yourselves and your activities. We sincerely hope that the effects of this urge will be evident in the next issue.

The men of 1922 are still moving about from place to place — always for the better, we hope. We give you herewith several address changes which have lately come to our attention: Charles C. Bray, from Chicago, Ill., to 601 East Manoa Road, Penfield, Upper Darby, Pa.;

Albert J. Browning, Assistant Operating Manager, Montgomery Ward and Co., Chicago, Ill.; Francis G. Davidson, from Pittsburgh, Pa., to 1432 Lee Street, Charleston, W. Va.; Richard E. Downing, from Bangor, Maine, to 508 Dryden Road, Ithaca, N. Y.; Joseph H. Flather, from Nashua, N. H., to 325 Berkeley Road, Indianapolis, Ind.; Major William F. Heavey, from Cleveland to U. S. Army, Office Chief of Engineers, Washington, D. C.; Richard M. Kasch, from Pittsburgh to 131 North College Street, Akron, Ohio; John P. Livadary, 2028 Calmenga Boulevard, Los Angeles, Calif.; Arthur L. Pitman, from Salem, Mass., to 1336 Virginia Street, Charleston, W. Va.; Otis H. Trowbridge, 50 Oak Lane, Pelham Manor, N. Y.

The Boston *Transcript* informs us that Samuel M. Seegal is giving a course in the evening division of the Boston University College of Business Administration. Seegal is now assistant to the Vice-President at William Filene's Sons Company. — Mr. and Mrs. George A. Marsh have announced the marriage of their daughter Louise, to our classmate, Ferris Briggs. The wedding took place October 4, at Scarsdale, N. Y.

Eric Hodgins is now Managing Editor of *Fortune*. I am sure that his many class friends in '22 will be happy to hear of this news. Eric, formerly Editor of The Technology Review, may indeed be proud of his publication, and judging from the difficulty of corraling it in the reading room of the University Club of Rochester, where your Secretary lives, *Fortune* must be enjoying great popularity everywhere.

May we suggest that wherever a group of 1922 find themselves together, either geographically, fraternally, or industrially, someone take the responsibility of writing a few lines to the Class Secretary. It will be appreciated by all the '22 readers of The Review. — C. KING CROFTON, *Secretary*, Rochester and Pittsburgh Coal Company, 604 Lincoln-Alliance Bank Building, Rochester, N. Y.

1923

G. Bertrand Will, X, of Glen Ridge, N. J., is reported engaged to Miss Ruth Morris Hyne, also of that city, by the New York *Herald Tribune* of August 27. L. E. Carlsmith, X-A, writes that he has recently joined the Standard Oil Development Company and has been stationed at Baton Rouge, La. He received a doctor's degree from Columbia last June.

Dick Frazier, VI, writes from Lawrence, Kansas: "During the present academic year, I am on exchange in the Department of Electrical Engineering at the University of Kansas. Professor R. W. Warner of the University of Kansas has gone to M.I.T. from here. Professor Dugald C. Jackson, Jr. ('21) is Head of the Engineering Department here, though he is also Head of Lewis Institute in Chicago. At the end of the fall semester he will give up the duties of head of department here and I will carry on during the second semester. Upon Professor Warner's return, he will become head of the de-

partment here. My mother is here in Kansas with me and we both are having a very busy and interesting time."

Dr. John W. W. Sullivan, III, writes from Cleveland: "I am in the steel business again — with American Steel and Wire Company in this city. Yesterday I was reminded of the fact that the center of gravity of the steel industry is gradually pushing westward. I was looking over two plants in the process of being razed which dated back to 1888 and thereabouts. The founding of these plants half a century ago marked a distinct step westwards. At that time Boston was a flourishing center of steel activity. Not many years later, a plant at which my father worked, the Norway Iron Works on what is now Dorchester Avenue, was permanently closed. And now two plants in Cleveland have been finally closed. Shall our grandsons a half century hence witness similar scenes further westward?"

Erling Skabo, XV, from Shanghai, tells what he has been doing since graduation. He had nearly a year with Baldwin Locomotive Works and another with General Electric Company before going to Oslo, Norway, in 1925, to spend four years, mostly in connection with radio broadcasting, and later five years as radio engineer for a Norwegian firm there. He came to Shanghai last year to do general engineering for a British firm, Reiss, Massey and Company, Ltd. He writes: "On the ship coming out here, I worked as deck hand and have never so thoroughly enjoyed myself and my work since serving in the Norwegian army in 1926. The life here in China is somewhat different from in Oslo and Boston, and I must say I rather like it, although the climate in Oslo is healthier and the environment offers more facilities for sports."

"Yes, the Cochrane's have moved again," writes Jack Cochrane, X-A, from 734 Brooks Avenue, Wyoming, Ohio, "this being the sixth place in which we have hung up our hats in and about Cincinnati since 1925 when I came out here to work with Formica Insulation Company. This time I hope we will stay put, for I broke down and built a little Colonial home, being convinced that now is the time to go into debt. For your records, if you keep us cataloged, our children number two: Jackie 9, and Joanne 7. And as for work, I am still researching and developing for Formica, who make laminated, synthetic plastic materials. Right now we are encouragingly busy, particularly in the decorative line for table tops, bars, wall paneling, store fronts, and the like. The *Queen Mary*, the English boat now being built, is to have some 60,000 square feet of our material in it. As for activities in the remaining waking hours, I have gone into the manufacturing business, producing an accessory for two types of movie cameras — the invention being called the Du Morr Radial Wipe. The gadget makes possible the wiping off the screen of one scene, followed by the next shot — an effect used extensively by professional cinematographers these days. Now my photography has degraded from

1923 Continued

a disease into a business! Tell the boys that should they *offer com bei Zinzinnati*, I'll do my best to find them a key to the city."

The Advisory Council on Athletics is bespeaking our assistance again this year. I'll be glad to forward any contributions, or they may be sent directly to Room 11-203, M.I.T. — HORATIO L. BOND, *Secretary*, 195 Elm Street, Braintree, Mass. JAMES A. PENNYPACKER, *Assistant Secretary*, Room 661, 11 Broadway, New York, N. Y.

1924

Address changes from the Alumni Office furnish a few clues to the whereabouts of members of the Class this month. John Fitch is discovered at Kensington, Md., having moved there recently from Alexandria, Va., and, so far as we can learn, is still one of the mainstays of the Federal Power Commission. The Bakelite Corporation, at 247 Park Avenue, New York, claims Preston Scott as its own, while Shorty Manning, still rising in the automobile world, has removed from Birmingham, Mich., to Pontiac in the same state.

A recent letter from Paul Cardinal not only announces that he has become a citizen of Passaic, N. J., but also states, in what sounds like a boastful vein, that John Charles Cardinal has arrived to make the fourth juvenile member of the family. Paul is still with Hoffman-La Roche in Nutley, N. J. Lester Leighton, who was with the Hygrade Company in Salem for some time, is reported as living in Richmond Heights, St. Louis, and a report on his business connection there is still awaited.

Seen on the street in Boston at all too infrequent intervals are: Jay Buswell, still with Westinghouse; Bert Stewart, who recently went with New England Power; Gene Cronin, district manager of the Telephone Company; Fred Ashworth, with a seafaring look in his eye and a Merriam Brothers yacht-fittings catalog under his arm; Bert Donkersley, up from Providence to sell some Grinnell fittings; Henry Stern, with a pleasantly legal manner; Gordon Joyce and Chris Conway, both handling traffic for the Telephone Company; Jack Stanton, hot on the trail of a million-dollar plumbing contract; Gordon Wheeler, with the plans of a fine new house or two which will be ready for customers in a few months; and Chick Kane, bent on engineering a new flood-lighting system which will use a lot of Edison current.

Within a short time, it is hoped that a staff of correspondents will be signed up to provide news of the Class on a territorial basis, so that more real information of interesting happenings will be available. In the meantime, the Secretary will welcome letters from members of the Class who have not reported their achievements, if any, or whose travels have brought them in contact with others in the Class. — F. A. BARRETT, *General Secretary*, 50 Oliver Street, Boston, Mass. ELMER W. BRUGMANN, *Assistant Secretary*, 123 Forest Hill Drive, Syracuse, N. Y.

1926

Please make a note on your calendars that the Tenth Reunion of the Class will be held on June 6, 7, and 8. It is hoped that the location will be settled before the first of the year and that a letter giving full information will go to all members of the Class within the next two months.

William E. P. Doelger is at the University of Cincinnati, conducting research in the Tanner's Council Laboratory. — Hank Hoar '25 was recently in the office and reported that he frequently saw Bean Lambert in Baltimore, where they both live. Bean has become one of the Class's most ardent aeronauts and radio specialists.

Lester W. Schoenfeld has moved from Philadelphia to New York, his address now being 60 East 96th Street. — Samuel J. Cole has moved from New Rochelle to Rye, N. Y., his address being 66 Milton Road. — Thomas L. Gledhill is President of the Technology Club of Lower Ontario (Toronto).

The notes of the Montana Society of the M.I.T. published on page II of this section report that Ernest C. VanBlarcom of the staff of the Anaconda Copper Mining Company at Great Falls and William Wraith, Jr., of the Anaconda plant at Anaconda recently attended meetings of the Society at Great Falls and Butte respectively. — For a house, designed for your Secretary, Robert C. Dean won the second prize in the 1935 *House Beautiful* small-house competition. — J. RHYNE KILLIAN, JR., *General Secretary*, Room 11-203, M.I.T., Cambridge, Mass.

1928

The frequency with which wedding bells continue to ring for our classmates is amazing. It isn't the spring which is causing the oft-repeated ringing either; perhaps it's a sign of better times.

The Dean Batchelders are now living in Pasadena, Calif. Their recent wedding was held in Hollywood at the home of Mr. and Mrs. Harmon Nelson. Mrs. Nelson is the moving picture star, Bette Davis, and she and Mr. Nelson were the only attendants. Mrs. Batchelder was formerly Miss Ellen Chase, daughter of Mr. and Mrs. C. A. Chase of Brookline, Mass. The Class sends its very best wishes to Dean and the new Mrs. Dean.

August 31 was the wedding day for Miss Elizabeth Adler, of Schenectady, and Dennistoun Ver Planck. Course VI will welcome the news of this happiest of events and the entire Class extends its congratulations. Dennis is now with the General Electric Company at Philadelphia.

The United States Diesel Engineering School in Boston now has a very happy assistant director. His name is Harlan Paige, XIV, and his happiness is caused by his recent marriage to Miss Beatrice L. Clark of Newport, Vt. Our heartiest felicitations to the Harlan Paiges, who are now living in Holbrook, Mass. — Next we jump out to St. Louis to extend our best wishes to the new Mr. and Mrs.

Frederick B. Wolf. Mrs. Wolf was formerly Miss Elizabeth Ann Combs and she is a graduate of Lindenwood College in Iowa.

Tufts College has a new assistant professor and that new assistant professor has a new bride. At the moment we haven't the old name of this new bride, but if the bride's husband will send us the old name of his new wife, we shall be delighted to correct this omission. Who is the groom? None other than John L. Barnes, who is one of our experts on radio. And to Jack we send a double congratulation; first, on his recent marriage, and second, on his appointment to the Tufts Faculty.

Crew enthusiasts will delight in this next announcement. Yes, sir, the long-awaited tumble is about to take place, for Mr. and Mrs. John A. Easton of Arlington, Mass., recently announced the engagement of their daughter, Miss Edith Louise Easton, to our '28 crew captain, Ernie Knight. Congratulations, old fellow; when is the big date?

The final note for this *affaire de coeur* section is a very unusual one. A member of the Class of 1928 is soon to marry a member of the Class of 1930. The announcement of the engagement of Miss Susan M. Murdock of Course VII (Public Health Certificate) and James Tully was made on August 14. Jim is with the Guardian Life Company and Miss Murdock is now Director of Health Education for the City of Boston. The Class extends its sincere best wishes to this All-Technology couple.

We used to call him Jack, but now, gentlemen, it's Dr. John W. Chamberlain, whose new office is 66 Commonwealth Avenue, Boston. John's new practice is limited to the "surgical diseases of infants and children." He has just finished four months as resident physician at Long Island Hospital in Boston Harbor and has recently been appointed assistant visiting surgeon at this same institution. Jack is associated with Dr. William B. Ladd, Chief of Surgical Service at Children's Hospital and has a new home at 15 Simmons Avenue, Belmont. We certainly are proud of the unusual progress which John has made in reaching the goal he set for himself after graduation in 1928. It has been a long road and John has certainly covered the distance most successfully.

Fritz Rutherford wrote us a very interesting letter from 16856 Fairfield Avenue, Detroit, Mich. By the way, Fritz, the address of your Secretary is given at the end of this section and we hope you will write again and often. Fritz recently changed from the American Gas Association Testing Laboratory to a position as sales engineer for the Detroit Brass and Malleable works. Between jobs he and Mrs. Rutherford took a long automobile trip to the West Coast, going the Southern route and returning across the northern states to Detroit. The new job consists of designing gas appliance equipment, cost accounting, production control, sales engineering, as well as other jobs which often fall Fritz's way. The primary job is

1928 Continued

sales engineering and Fritz's territory is everything east of Buffalo and Pittsburgh. Any of the VI-A gang who get to Detroit are cordially invited to drop out and visit the Rutherfords.

Our last note is one that we mention with sincere regret. The Boston *Traveler* recently announced the most untimely death of Lieutenant John J. Herlihy, an Annapolis graduate who took his advanced studies in naval architecture at the Instituté with our Class. Lieutenant Herlihy was stationed at Manila in the Philippines at the time of his death. — GEORGE I. CHATFIELD, *General Secretary*, 5 Alben Street, Winchester, Mass.

1929

Information of interest to the Class has been mighty scarce this fall; in fact, until just now there has not been a letter since last spring. Brig Allen saves the day again, however, with one of his fine, newsy letters about himself and those of us he contacts in his travels. That grand and very welcome epistle follows: "I am sorry that I have not written for all this time. It must be about a year and a half now. I have started to do it many times and have always put it off. In the first place, I suppose that I should tell you about myself and then give you any other news as I go along. About the first of June, I was transferred from Washington to York, Pa., on some special work. On the 15th of July I was moved up here in Boston as district manager for our New England territory. It was a nice promotion, the work has been very interesting, and being back in Boston has been a good deal of fun since I am still single. You old married men wouldn't quite appreciate it the way I have. It seems funny to change my job again so quickly, but I have decided to leave the company the first of December and will go home and take over the family business. My address after that time will be 14 Colonial Place, New Rochelle, N. Y., and you might mention in *The Review* that if any want to purchase a good house or place some insurance business after that time to come around and see me. New Rochelle is a fine town to live in and we have some good houses cheap. Don't know much about that business and it will be quite a change to make after the work I have been doing, but I guess I can learn the business after a while. My father is also President of a bank at home and felt that he had to spend all of his time on bank work. For that reason, he wanted to turn over to me his real estate and insurance business and if I did not take it, would sell the business. I just couldn't turn it down in spite of liking what I am doing now.

"I am responsible for not having made a report on the five-year reunion. If it is not too late to mention it, I want to say that we had an old rip-snorter. There was a good crowd back and I think everyone had a good time. Taking it all in all, there wasn't anything really bad about it except the fact that all of you other fellows couldn't have been there. Bill Aldrich and Jack Hallahan borrowed Wally Gale's car and headed for Worcester to

get Bernie Brockelman out of bed and drag him up to the reunion. They took at least one curve too fast and that was the end of the car, but both Jack and Bill came out of it all right. The sad part of it was that Wally had just had the car a couple of weeks and it was just broken in nicely. However, I imagine by this time that he has had a chance to break in a new one. While I think of it, I have not seen Wally since that time but he has left the Institute and has taken a job with the Bendix Corporation, South Bend, Ind. If any of you fellows are in Detroit, look him up and give him my regards. Might tell him also that I am living with Bob Snyder and Tex White here in Boston and at the Riverside Apartments.

"Have to finish this in long hand since Miss Quinn just came back from lunch and won't let me use this machine any more. George Walker is taking care of the police department in Bright Waters, L. I. Hal Baker is married and is teaching school some place in Maine, I believe Biddeford. Dick Boyer is working for du Pont Film Manufacturing Company in Parlin, N. J., near New Brunswick. We just put in a range drive down there on a shooting range. Wonder if he has seen it? Jack Osborn is working for Forbes Lithograph Company in New York and, I understand, lives in Larchmont. Will look him up as soon as I get home. It's just next door.

"Have seen Fish Hills and his wife, Peggy, some since I have been here. They put me up for a few days when I first arrived and took care of my dog for me. Fish is doing a pretty good job with Dewey and Almy as assistant plant manager, and he has two fine youngsters. Saw Jim Magen is the other day. He is in business for himself selling a new oil for use in breaking in new motors. He can, after a six-hour time, permit you to drive any new car at maximum speed without injury to your cylinder walls, pistons, or rings. It sounds too good to be true, but it really does work. He's doing right well.

"The address of Wally Gale is 800 East Jefferson Boulevard, South Bend, Ind. Eric Bianchi is working for the Mason-Neilan Regulator Company of Boston. He's doing right well and it was good to see him again. He and Kay haven't done so badly either. Old Mumpy Mac was working for N. E. Whiting Corporation but now is with the Chrysler Corporation in Detroit. Good luck to him with his new job.

"Jack Hallahan was erecting an oil plant in Providence for Badger Corporation but where he is now can't be told. Wish he would report. I stopped in and saw Bernie Brockelman, my old basketball running mate, in Worcester the other day. Brock is married and has two boys. If any of our Class want to sell some peachy jam or canned beans, go see Brock. He does all the purchasing for the chain stores. Brock hasn't changed much, but is rather the settled gentleman. I bumped into Curt McCune in Philadelphia some time back. He is married and doing well with an investment concern. Don't know any

particulars. Must go now. Probably will think of a lot of other things as soon as I mail this. Promise not to wait so long on the next letter. Sorry to hear about your fire. Hope this finds you well, and if you ever do get to New York, please give me a call. My home number is N.R. 3458 and my office will be 746."

Don't you all agree now that Brig does more than his share to brighten up our news when he takes his pen in hand? Let's show our appreciation of his generosity by giving up a little of our own time to write a few words, at least, of our own travels and contacts. Here in Akron we keep up with life in about the same jobs as last year. Hank Gibbons, II, is still with Goodyear Zeppelin Corporation, as is Hal Dick, II. Hal is fortunate again this year in that it looks as though he is to be sent back to Germany again this coming year for further experience in the German "lighter-than-air" industry. His last year there saw him making numerous trips from Germany to Brazil on the *Graf Zeppelin*. Gene Gilman, X, is still in chemical engineering work, as is Johnny Hartz, X.

Your Secretary is just finishing the job of rehabilitation that was started after our home burned down last December. We have built a new house and have had it completely furnished with new furniture as a result of losing all our old stuff last winter. It makes an excellent combination, however, since it makes just the right selection possible. Yes, I'm still working as engineering contact man for Goodyear with a number of the automobile companies in Detroit and, much to my wife's disgust, spend quite a little time each week in that city. Incidentally, if any of you happen to be in Akron, plan to look me up and we'll have a royal time reminiscing. — EARL W. GLEN, *General Secretary*, Box 178, Fairlawn, Ohio.

1932

In spite of the long absence of these notes from *The Review*, I have not received one single note asking for them to be continued. Once more, however, I will try to put down a few of the items of supposed interest to our classmates. The gang are certainly taking on the bonds of matrimony, as the following list, arranged chronologically, will show.

Tom Rhines married Miss Olive Symonds of Wetherfield, Conn. Al Mulliken married Miss Elizabeth Lombard. Their home is in Wenham. Philip Benjamin married Miss Helen Mather and they are now living in Melrose. Israel Liben married Miss Catherine Miller of Mattapan. John McCaa married Miss Helen Horton; home address, 916 West Princess Street, York, Pa. Stuart Fleming married Miss Alice Glannon of West Orange. We announce also the engagement of two members of our Class, Miss Katherine Sarabia and Owen Burrows.

Probably many of you belong on the above list, but I have no such information. Only one of the above sent me an announcement, so that I might pass the information on. When you are sending all

1932 Continued

those announcements, how about including the Class Secretary? — CLARENCE M. CHASE, JR., *General Secretary*, 539 Central Avenue, Bound Brook, N. J. CARROLL L. WILSON, *Assistant Secretary*, Room 3-210, M.I.T., Cambridge, Mass.

COURSE V

Ed Nealand did not say very much about himself aside from the fact that he is still with Carter's Ink and going strong. He had quite a lot to say about some of the other fellows, however, and his letter furnished most of the information given below. Phil Cook is married and from that we conclude that he must be working. Ernie Steele is working for the Atlantic Research Association. Elmer Stotz is still working for his Ph.D. at Harvard. Phil Bruce, being employed by Simplex Wire and Cable, has also dared to take the matrimonial plunge. This letter could well have been written by some matrimonial agency, for that seems to be the mainstay of the news. I am scheduled for next year.

Carl McKinney writes: "For the past two-and-one-half years I have been employed in the Engineering Department of the United Gas System. My work had been principally that of doing research in soil corrosion, electrolysis, cathodic protection of pipe lines and the designing of transmission gas systems. Recently I have been transferred to the air-conditioning department of the same company, in which I am designing equipment, and so on, for various installations. I have been very pleased with my work and find it very interesting. Lest I forget some of the most important things, I wish to add that I have been married for a year and a half, and am living in Houston, Texas. A letter from fellow classmates will reach me at 806 MacGregor Avenue, and it will be greatly welcome. Extend my regards and best wishes to all of the course-mates."

One last word about myself. After working for a year in the lacquer industry and a year making latex cements (with all the titles and salary of a grand duke of Russia), I have accepted a fine position with the Firestone Footwear Company and find my time enjoyably and profitably spent.

Curtis Tucker was married last July to Miss Ruth Hopkins of Bridgeport and also has a new job. His new address is 44 Rowland Road, Fairfield, Conn. — Mal Davis gets the spotlight twice also. Mr. and Mrs. are rejoicing on the arrival of the first born, Charlotte D., September 11. Again, Mal has given up school teaching to return to his profession. — JOHN RICHARD RAFTER, *Secretary*, 80 West Center Street, Akron, Ohio.

1933

As this is written, the writer has just returned from another successful class dinner here in New York — the first of the season and things promise to be more lively than ever. Ed Goodridge is now Secretary of the New York gang as well as his Course and has a head full of good ideas. If any of you are interested in these

meetings and are not receiving notices, please contact Ed or yours truly. And speaking of Ed, have you heard that he is going in for playing church music — don't let that mislead you too much — that sign flashing gadget of his has now been applied to control the music at a church here on Long Island. Ed expects more business in this line — no telling where he'll be next.

Don Fink took another step up the ladder recently when he became Associate Editor of *Electronics*. We are pleased to hear of it, Don. — A recent newspaper article tells of Larry Jacobson's brain child for trapping speeders, consisting of two photo-electric cells measuring the time interval required by a car to pass a standard distance.

The society pages tell us of the engagement of Jack Couch to Miss Eleanor Chance of Chicago; the engagement of Burton Ellis to Miss Amy Bell Clark of Medford; the marriage of Jack Farmer to Miss Beatrice O. Bates at Medford (they are living in Wollaston); the marriage of Leo Dewar on November 24 (the Dewars are living here in Brooklyn).

Several of Course I men who were with the Coast and Geodetic Survey have recently changed their place of business: Farney and Nedbor are now at the Navy Yard in Brooklyn; Bill Conant is with du Pont Rayon; Al Minkus is with the City of Hartford Water Department.

And here's a very last minute piece of correspondence from Fred Murphy: "I saw Len Gifford last Sunday and he informed me that you had a bit of a dearth of class notes, so I am sending a few from the southern New England section."

"At a meeting of the Technology Club of Rhode Island at Warwick Country Club the other night, I met Duke Selig, who is still with the Blackstone Valley Gas and Electric Company, and Roger Congdon of the neighboring Narragansett Electric Company. It looks as though the power business will soon be monopolized by Course XV in this section. We missed Win Adams, who is now office manager at the Builders Iron Foundry in Providence.

"Tom Hayden comes down from time to time out of the mountains of New Hampshire. He is connected with the New England Power Association and at present is assistant to the manager of the Grafton County Power and Light Company in Lebanon, N. H. Tom complains that the fair sex in those parts is conspicuous by its absence; you might inform the boys that if they have any addresses thereabout, they would certainly be appreciated.

"I am still with the Waypoysset Manufacturing Company — fine silk and rayon fabrics. If you have any influence with your lady friends in the matter of purchasing garments, kindly oblige by recommending rayon."

As this is to appear in the December issue, in the mail at the beginning of the month, may I be the first to wish you a Merry Christmas and Prosperous New Year. — GEORGE O. HENNING, JR., *General Secretary*, 163 Barbey Street, Brook-

lyn, N. Y. ROBERT M. KIMBALL, *Assistant Secretary*, Room 3-106 M.I.T., Cambridge, Mass.

COURSE VI

Recently I had the pleasure of having both John Clark and Bob Baker visit me at my shop. I was very much surprised to see Bob Baker; thought he was married and settled with his beloved Thelma in Concord, N. H. Bob finished up his work on geodetic surveys and was searching for a new job. His chances of getting one with the Budd Wheel Company in Philadelphia were good. I hope the job materialized. While the two bottle snatchers were here, we visited some new places in the Village. John's capacity, however, was not reached, as per expectations.

Our first class dinner of the season was held at the Tech Club, October 24. We had a good turnout, and a grand time was had by all; not many electricals present. We are planning on having our next dinner at Paradise Cabaret at Times Square.

John Clark is still on the pay roll of the Habirshaw Cable and Wire Corporation in Yonkers. His work as research and efficiency engineer has brought him in contact with most of the swell gals in the plant, and he is having a grand time while still single. I am told it won't be long before he will be down on his knees and taking the vows of marriage. His recent increase in salary will help.

From Asbury Park we hear good news from the former politician, John Logan. John has recently gotten over an eight-month illness, but is up and out in good health again. With the usual smile and captivating personality, John has had a choice of jobs. He is now employed with Jersey Central Power and Light Company in charge of relay testing, a responsible job with good pay.

As for myself, I am still in business, manufacturing timing equipment, sign flashers, chime controls. I am now building a color comparator, for determining and matching the color of coffee while being roasted in continuous process. Business is good, and improves every month. Have had an offer of being bought out by another company, but did not accept. They are still trying, and offers are a bit more lucrative, a five-year contract for employment guaranteed.

If you have any news of interest to the members of VI, please don't hesitate to send it to me. In addition, you will get your name in this magazine. — EDWARD S. GOODRIDGE, *Secretary*, 791 Broadway, New York, N. Y.

1935

Well, gang, here we are with another month gone by and a bit of improvement in the news returns. Many of the fellows are sending in dope about others in the Class, which is appreciated very much, but why don't some of you send the news in first-hand? We'll run right through the courses by number. George Bull dropped me a line saying that he has started his job with the New York Telephone Company. He reported in Albany, but was immediately sent to Buffalo. There he

1935 Continued

looked up Bernie Nelson, who is working for the same outfit. Both the lads are starting at the bottom of the ladder as cable splicers' helpers. After spending two weeks at this job, George was sent on the road, driving a truck, and stopping for about a week in each burg. Winnie Winiarski writes that he is working with the U. S. Engineers on Flood Control work in Elmira, N. Y. He spends most of his time in the office, but does field work occasionally. He complains that the social side of the job is rather dull. Winnie expects that the work will last for about another four months.

Eddie Woll is the only one of the Course II crowd to write, but what a letter: "You asked for it; here it is — news of that hectic gang, Course II, of senior banquet notoriety. Reading from south to north and west to east: Phil McGooohan and George Peterson are holding their own at Port Arthur, Texas, for that Good Gulf Gasoline outfit. Phil McGooohan is in charge of pump testing, and Peterson is supervising construction at the new refinery. Their address is: 2701 Lakeshore Drive. Don Purcell, after an escapade at Monyana's, hauled out of the U. S. A. for his home, Gibraltar, at Annotto Bay in Jamaica, B.W.I., where he is holding down a job, the nature of which is at present unknown. Out in the windy city, Elmer Szantay is aiding operations for the Sinko Tool and Manufacturing Company. Down in New Brunswick, N. J., the cops are probably having a hectic time trying to keep peace at 91 Ray Street, Eddie Prohaska's apartment. He is with International Motors. Old Bean Town still retains three of its loyal sons, Al Fletcher, Mac, and myself. McLeod is assisting in the automotive laboratory at school. Fletcher and myself are building our Navy's fleet at the Bethlehem Shipbuilding Corporation, Ltd. Fletcher is working in the yards for the Q department (outside machinist to you) which has charge of installation aboard the ships. As for myself, I try to keep busy in the engine drawing room. Say, Bob, here is a good port in a storm — the Flag Ship on Provincetown's main stem." I'll have to investigate the Flag Ship, since it's not far from my present regal residence. Incidentally, I ran across Fletch the last time I was in Boston. We both happened to be at Sears' main store. He seemed to be fairly well pleased with his work and parted saying that he would leave me to build the nation's canals while he built the Navy's ships.

Carl Floe is the only graduate student of the Class of '35 about whom I have a little information. Carl and Peggy Proctor, one of the better known of the fair sex at school, were married a short time ago. Carl is going to teach at Washington State College, School of Mines and Geology. They are living in Chehalis, Wash. Also in Course III we have a bit of news from Ed Clark, who writes that Bob Clarke is back at school working as a part-time assistant. Jim Casale is working in Bingham Canyon, Utah. Dunlap is a part-time assistant at school. Frank Lovering is somewhere in Okla-

homa. Villa is back in Columbia, where he originally came from. Goldberg, who left a few years ago, has returned to complete his undergraduate work. Jack Orchard is married and attending Harvard Law. Dick Hughes is in Hartford, Conn. Don Morrison and Bob Forster are with the York Ice Machinery Company in York, Pa. Guy Haines is with the Navy Air Corps in Florida. Whit Stueck is with a shipbuilding company in New York. Ed himself is back at school working for a master's degree.

Rod Brookman wrote an interesting letter; here is part of it: "During most of the summer I've been chasing jobs all over the country, but it wasn't until just recently that a concern had nerve enough to employ me. The brave, adventurous company is Eastman Kodak. The funny part of the whole thing is that I swore up and down in school that I would never get into engineering as an architectural engineer and now that is exactly what I'm in." He reports that Al Hamilton has been working for the Taylor Instrument Company in Rochester since early in the summer.

Jud Briefer dropped me a line a short time ago which I think you would appreciate reading verbatim, so here it is: "I forgot that you had become a member in good standing of the Bureau of Vital Statistics, otherwise I would have forwarded the newspaper clipping in which my name appeared, the second time in my life I made the news — first time when I was born. It's a great feeling to be in the public eye, yes, sir! Here's the dope to file with my finger prints: Married to one Florence Dana (of the 'Bawstin' Danas) on August 20, with no hysteria to speak of. You probably met the gal at one of the dances or something. She's known from the Burton Room to the top floor of the Sis house. Place of the holy ceremony: Rochester, N. Y. I am now employed as a safety engineer with the Liberty Mutual Insurance Company. Salary: Disgustingly low, but you know how it is. At present I am oscillating between the four upper New York State offices — Buffalo, Rochester, Syracuse, and Albany. . . ."

From a couple of newspaper clippings I have a bit about Sam Paul. He was married to Miss Gladys Blutein on Sunday, September 22. Sam is going to live in Cambridge until he completes his course at Harvard.

Tony Dauphiné has reported again and says that Bill Barker and C. J. Wilson are working in the laboratory of the Union Oil Company. Their address is Oleum, Calif., where the weather is slowly converting them into good Californians. According to George Hunt, he is earning his salt developing new compounds (control and development lab) for U. S. Rubber at their footwear plant in Naugatuck, Conn. Grasselli Chemical Company at Grasselli, N. J., is employing Joe Haggerty. He is running an evaporator now, but has hopes of going into the control lab soon. Ed Gelus is working for an oil company in Houston, Texas, where his address is 203 Drennan Street. He

seems to be getting a training course and has been doing everything from making thermocouples to working with a pipe gang. Sid Fox and Ralph Jacobson were last reported on the trail of jobs with good prospects in sight. Thanks, Tony.

One of the most amusing letters I have received is from Bill Abramowitz, another of our expert chemists. Here it is *in toto*: " . . . I've been busy chasing that ephemeral thing termed 'job' (by the way, I can't seem to find many who've heard of the word — let alone caught up with the bally thing) that even now I'm not sure that this letter will be finished in the same state in which it was begun. There didn't seem to be any mention of it in The Review, but the Tech Club here (Editor's note: New York) had its first meeting of the year on September 17. A goodly sprinkling of '35 were present — vying with '34 in beer guzzling. I think '34 won — Charlie Lucke was around. When we left he had just begun his 3rd keg. But to be fair to Lucke, the ubiquitous Brooksey '36 drank eight pitchers of the second keg. Dave Wood was here. Milt Wise and Lester Lappin drove down from Boston, job hunting. Tom Church is now on a PWA boondoggle — as is Bernie Berger. Dean Dadakis, I believe, was to have rendered the affair for The Review. Of '34, Larry Stein, Tuffy Emery, Sam Joroff, and about a dozen others were there. They had a class dinner before the meeting. I bumped into Benny Blocker the same afternoon on 42d Street and Sixth Avenue. He had come down from the Athens of America to bring some color into the life of the local paint chemists. Visited Paul Panagiotakos in Philadelphia about two weeks ago. He's working for the Atlantic Refining Company and is having the time of his life. I went with him to a Greek restaurant in a quaint corner of the town and ordered by pointing and Panther's taste. At that, 8.01 and 8.02 are valuable, I did know the alphabet. They were just having the elections for mayor and every store carried its own candidate. From the variety of posters, it seemed that 90% of Philadelphia's population were honest and noble and that all of them were running for mayor. To return to Pansy, he likes his work, studies at night, and calls his girl friend in Boston every week. Stocky (Wimpy) and I drove to Boston the week-end before he sailed (Wednesday, September 25). McTavish also graced the trip. We tried to assemble a class dinner for him, but Walt managed to elude it. Leo Epstein was here, Ed Taubman, Jerry Golden, Walt Daley. Leo has decided against returning to school. Ed and Jerry are working in town. In spite of prevailing notions, the millennium has arrived. Ed was complaining because of the insufficient amount of work in his office. He graces the firm of B. Altman. Golden is with the General Accessories Company, trying to sell all the gadgets that Rube Goldberg can invent. Fred Travers finally decided not to go to the Bahamas and, I believe, is working somewhere near Boston. Gordon Gott is working with some utilities concern near Cam-

1935 Continued

bridge. Bill Lauder is testing steels in Kearny, N. J. Paul Goldberg visited me in Lakewood for a few days. He started off with his sister about August 1 for a trip to California, and turned his shiny new Plymouth on its head somewhere in Colorado on the return trip. They took the bus home. I think he intends to return for graduate work. . . .

We have news from two of the Course VI lads. Beverly Dudley writes that he looked for work in his home town of Chicago for a long time and then decided that he would have a better chance in the East. After coming back East he had offers to work from seven sources. Some of you electrical engineers who have not as yet landed a job had better write to Bev and get some news about the other six. He is working for the Radiotron Division of the R.C.A. Manufacturing Company as an "electrical engineer." Address: 544 West 110th Street, New York City. He reports that the first chap he ran into at the plant was L. B. Curtis, Zay's brother. He says also that Wilfred Grosser is at the Federal Ship Building and Dry Dock Company at Kearny and is satisfied with his lot. Beverly has registered in the Engineering School of Columbia to do graduate work. The other Course VI man to let us in on the secret is Dick Campbell. He has started his work at the University of Kansas as an instructor. He is not alone there, for Professor Frazier is there also, on exchange with their Professor Warner. D. C. Jackson, Jr., '21 is there, as well.

Course VII crashed through this time. Bob Scribner wrote to say that he is studying human anatomy at Harvard Medical. It seems to me that Bob has studied quite a bit on that subject already, right? He reports: "Ralph Woolf is taking up medicine at Rochester; Tony Lotowycz is still in Boston and continuing his graduate work at Tech — specializing in public health and epidemiology, right now. Fred O'Brien has also turned medico. He's at Tufts and still smiling. Helping around the department in the various laboratories are Dave Greenlie and Saul Shapiro, while Barclay Bloomgarden is struggling along in his own private department finishing up a thesis. Herb Plass '34, who was married this summer, is also trying his best to stay in the run at Harvard Medical. Sherm Leavitt, too, has joined the Harvard-Tech men, but he's only in for two years at the Law School." He also writes that Fred Lincoln is in the duPont kingdom at the Wilmington plant of General Chemical, and that Howard Mason is doing work on vitamins for a master's at Tech. He brings the welcome news to those of the Walker staff that Ken Cook is doing pretty well at the New Hampshire State Sanatorium. He would like to hear from the fellows on the Walker staff. From a newspaper clipping, I have the low-down on Eddie Friedman. He is engaged to Miss Goldie Anne Isenstein of Mattapan.

It was gleaned from the Alumni Association that Bill Buechner is working in the Physics Department at school.

Lars Ekwurzel has landed a job with the McGraw-Hill Publishing Company and is well pleased, as the job is "interesting, pays well, and is right in line with my future plans and ambitions." His work consists of editing, market research, and promoting advertising space for *Electrical Merchandising* and *Radio Retailing*, two trade papers in the retail marketing of electrical appliances and radio. One of his bosses is the father of Lester Moffatt, Jr., and there are several other Tech grads in the organization. He reports that he ran across Ed Edgar, who is working for the Pennsylvania Power and Light in Allentown, Pa.

The following quotation is from the *Northern Daily Mail* in Hartlepool, England, and shows the respect they have over there for the chemical engineering course: "Alfred McDonald has succeeded in obtaining the degree of Bachelor of Science in the Chemical Engineering Division of the M.I.T. McDonald sends us a very interesting letter giving his impressions of life in the States, and telling of a holiday in Canada last summer." Continuing with the chem engineers, Chuck Chakmaklian is finishing up a thesis at school and has not landed a job yet. He hopes to land one soon, as "there is a certain little brunette waiting." Hope you get that job, Chuck, and that it pays well enough to support a wife "in the manner to which she has been accustomed." Charles Smith broke down and wrote me a letter a short time ago. Smitty, Hank Ogorzaly, Roy Whitney, and Johnny Howell have been stationed at Buffalo in the practice school. By the time you read this they will be in the Bangor school, and they will return to Technology in January. While in Boston, Smitty ran into Johnny Bainbridge who is working at the Merrimac Chemical Company. He thinks that Dick Smith is working in Boston for a Canadian insurance branch office. Why not write and confirm this, Dick?

Art Haskins seems to be having a hectic time. He has become so prosperous that he has purchased a motor cycle and is tearing about the country on it. Art is working in the "Follow-up-and-Push Department of the Bath Iron Works' outside machinists' gang." He divides his time between the yard office, the machine shop, on board boats, and running about wildly. He is pleased with the work, for there is plenty of time to prowl about and learn plenty. Then, too, he is on his own most of the time.

Turning to the bookkeepers, we find them very much in the marrying mood. Maybe they are marrying the bosses' daughters. A newspaper clipping informs us that Dave McIntosh has taken the fatal step, the lucky girl being Miss Helen Berry, and the date was September 7. Likewise, Henry Bromley has fallen a victim of Dan Cupid's missiles. Henry and Miss Ruth Ward Dana were married in Brookline on August 27. Congratulations to both of you and best wishes for a happy, successful future. Joe Kemper was not employed when last heard from, but had several good prospects. He com-

plained of longing to return to the old grind. I agree with him whole-heartedly.

Dan Cupid certainly seems to have been doing a good job on the Class; even one of the lowly carpenters has been struck. Ken Warren and Miss Elizabeth Louise Street are engaged. Let us in on the glad news, Ken, when the wedding takes place. Larry Hall gave up trying to stand the meals at his boarding house and has rented a house in Sandwich, Mass., with a couple of other fellows working for the U. S. Engineers on the big ditch. Incidentally, one of them is Bill Murphy '33. A few weeks ago the Sagamore Rifle Club had its first practice session, and, as might be expected, Larry and Bob Greer were there with bells on. Bill Murphy and your class snooper were the other two representatives of Tech. It begins to look as though the publicity game is going to stick with me for a while. The Sagamore Men's Club has just elected me the publicity chairman.

I've saved until last the news about our Class President. In his own words: "Of course, I've heard you've been helping the gov'mint on the Cape ditch. I hope you enjoyed it as well as I did my summer job. I was in the research lab of General Printing Ink Corporation in New York. I had a great deal of freedom, was often my own boss, and learned a lot. I was able to apply quite a bit of my schoolroom chemistry — more than I thought. My work consisted of research on synthetic resins, new solvents, and so on, as well as a great deal of analysis which was far from routine stuff because it was so different from anything we had at Tech. I made occasional use of a color analyzer which preceded Professor Hardy's machine. Hardy's machine traces its own color curve in about one minute, while with this one, it took about half an hour of eye-blinking to make one. God bless the photo-electric cell and Hardy."

"For recreation I played a good deal of tennis and swam quite a bit, mostly at the Jersey shore. One Sunday a sinister note was struck, as I had the unpleasant experience of holding up a drowning drunk in a strong sea breeze, only to have a bunch of bungling fools tie a life line to him and pull him under water about 100 feet instead of waiting for an approaching rowboat. Result — all attempts at resuscitation (with pulmotor and oxygen tanks) were fruitless. Gad! the guy's eyes went glassy while I was holding him. . . .

"Ed Helwitt was a councilor at Braut Lake Camp, N. Y., this summer, teaching the kids radio. Intends either to get a job or to do graduate work at Columbia. — Fiske King blew in from Ambler, Pa. (all covered with asbestos). Looked great and likes his job. Gerry Golden works in New York City for General Accessories Company. — Dave Buckwalter is still in Newport, Maine, in a paper mill (also Carl Smith and Johnny Teasdale)." — ROBERT J. GRANBERG, *General Secretary*, 9 Old Town Road, Wellesley Farms, Mass. JOHN D. HOSSFELD, *Assistant Secretary*, 23 Hale Street, Beverly, Mass.

CHART FOR ESCAPE from WINTER

CUNARD WHITE STAR
Sunshine Cruises
 REACH EVERY PLEASURE PORT ON THE MAP

(1) Bermuda. (2) Nassau. (3) Havana. (4) Haiti. (5) Virgin Islands; St. Pierre and Fort-de-France, Martinique; Barbados; Brighton and Port of Spain, Trinidad. (6) La Guaira, Venezuela; Curacao; Cartagena, Colombia; Colon, Panama Canal Zone. (7) Kingston, Jamaica.
 (Numbers are keyed to schedule below)

FROM N. Y.	SHIP	ITINERARY	DAYS	PRICE, MIN.
DECEMBER 21	Georgic	(1, 4, 3, 2)	11	\$132.50
DECEMBER 27	Majestic	(2)	5	60.00
JANUARY 25	*Carinthia	(2)	6	70.00
FEBRUARY 1	*Carinthia	(2)	6	70.00
FEBRUARY 7	Georgic	(5, 6, 7, 3)	18	210.00
FEBRUARY 28	Georgic	(5, 6, 7, 3)	18	210.00
MARCH 20	Georgic	(5, 6, 7, 3)	18	210.00
APRIL 10	Georgic	(1, 2)	8	100.00

***AND EVERY SATURDAY THEREAFTER TO MARCH 28 INCLUSIVE**

AN ambitious program, indeed . . . as varied as the isles of the South . . . as dazzling, warming, as Caribbean sunshine! This year it's easier than ever to make a glamorous getaway from grey horizons . . . to let the dash and verve of a Cunard White Star sailing lift you smartly from your personal humdrum. You have merely to check your date on the schedule above . . . your Chart for Escape from Winter!

You have the best of the fleet to choose from: Britain's finest, most modern motorliner . . . and the second largest ship in the world . . . and a famous world-cruiser. Between them they give you the most enticing ports of the West Indies and South America. Pick your ship and your islands . . . you can obey that urge to be free and be happy, practically any time you feel it.

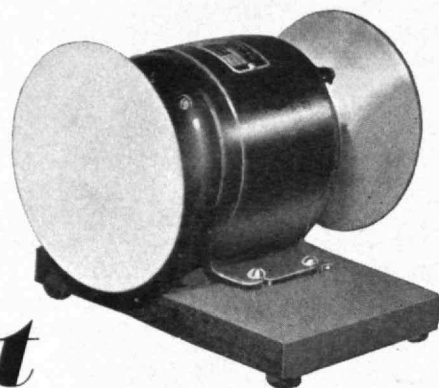
Book through your local travel agent or Cunard White Star Line. Offices at 25 Broadway and 638 Fifth Ave., New York, and in other principal cities.

CUNARD WHITE STAR

STOPS MOTION!!



THE STROBOTAC, a development of Messrs. Edgerton and Germershausen of Massachusetts Institute of Technology, is ideal for examining the performance of all small rotating and reciprocating machines . . . motors . . . generators . . . engines. It requires no electrical or mechanical connection to the machine under observation . . . it has a speed range of 600 to 14,000 rpm . . . it reads directly in rpm with an accuracy of $\pm 2\%$. . . it is portable . . . and it costs only \$92.50.



first

We pasted a sheet of printed matter on a disc, attached the disc to a small motor and turned on the motor. At 1,800 rpm here's what we saw on the disc. . . .



and then—

We turned on the STROBOTAC, directing its beam of light on the disc; we turned the STROBOTAC speed control until the disc appeared stationary, and then we photographed the disc . . . so you could see what we saw. The STROBOTAC is not intended for photography, but this unretouched photograph of the disc revolving at 1,800 rpm shows how completely the STROBOTAC stops motion. For visual observation the illumination from its 8-inch beam is more than adequate.

WRITE FOR BULLETIN EX-3508-T FOR COMPLETE DETAILS

GENERAL RADIO COMPANY
Cambridge A, Massachusetts
